NEXCOM International Co., Ltd.

Mobile Computing Solutions

Industrial Fanless Computer

VTC 7220-R Series

User Manual

NEXCOM International Co., Ltd.
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Preface

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Acknowledgements

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Regulatory Compliance Statements

This section provides the FCC compliance statement for Class B devices and describes how to keep the system CE compliant.

Declaration of Conformity

FCC

This equipment has been tested and verified to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area (domestic environment) is likely to cause harmful interference, in which case the user will be required to correct the interference (take adequate measures) at their own expense.

CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

RoHS Compliance

NEXCOM RoHS Environmental Policy and Status Update

NEXCOM is a global citizen for building the digital infrastructure. We are committed to providing green products and services, which are compliant with European Union RoHS (Restriction on Use of Hazardous Substance in Electronic Equipment) directive 2011/65/EU, to be your trusted green partner and to protect our environment.

RoHS restricts the use of Lead (Pb) < 0.1% or 1,000ppm, Mercury (Hg) < 0.1% or 1,000ppm, Cadmium (Cd) < 0.01% or 100ppm, Hexavalent Chromium (Cr6+) < 0.1% or 1,000ppm, Polybrominated biphenyls (PBB) < 0.1% or 1,000ppm, and Polybrominated diphenyl Ethers (PBDE) < 0.1% or 1,000ppm.

In order to meet the RoHS compliant directives, NEXCOM has established an engineering and manufacturing task force in to implement the introduction of green products. The task force will ensure that we follow the standard NEXCOM development procedure and that all the new RoHS components and new manufacturing processes maintain the highest industry quality levels for which NEXCOM are renowned.

How to recognize NEXCOM RoHS Products?

For existing products where there are non-RoHS and RoHS versions, the suffix "(LF)" will be added to the compliant product name.

All new product models launched after January 2013 will be RoHS compliant. They will use the usual NEXCOM naming convention.

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Warranty and RMA

NEXCOM Warranty Period

NEXCOM manufactures products that are new or equivalent to new in accordance with industry standard. NEXCOM warrants that products will be free from defect in material and workmanship for 2 years, beginning on the date of invoice by NEXCOM. HCP series products (Blade Server) which are manufactured by NEXCOM are covered by a three year warranty period.

NEXCOM Return Merchandise Authorization (RMA)

- Customers shall enclose the "NEXCOM RMA Service Form" with the returned packages.
- Customers must collect all the information about the problems encountered and note anything abnormal or, print out any on-screen messages, and describe the problems on the "NEXCOM RMA Service Form" for the RMA number apply process.
- Customers can send back the faulty products with or without accessories (manuals, cable, etc.) and any components from the card, such as CPU and RAM. If the components were suspected as part of the problems, please note clearly which components are included. Otherwise, NEXCOM is not responsible for the devices/parts.
- Customers are responsible for the safe packaging of defective products, making sure it is durable enough to be resistant against further damage and deterioration during transportation. In case of damages occurred during transportation, the repair is treated as "Out of Warranty."
- Any products returned by NEXCOM to other locations besides the customers' site will bear an extra charge and will be billed to the customer.

Repair Service Charges for Out-of-Warranty Products

NEXCOM will charge for out-of-warranty products in two categories, one is basic diagnostic fee and another is component (product) fee.

System Level

- Component fee: NEXCOM will only charge for main components such as SMD chip, BGA chip, etc. Passive components will be repaired for free, ex: resistor, capacitor.
- Items will be replaced with NEXCOM products if the original one cannot be repaired. Ex: motherboard, power supply, etc.
- Replace with 3rd party products if needed.
- If RMA goods can not be repaired, NEXCOM will return it to the customer without any charge.

Board Level

- Component fee: NEXCOM will only charge for main components, such as SMD chip, BGA chip, etc. Passive components will be repaired for free, ex: resistors, capacitors.
- If RMA goods can not be repaired, NEXCOM will return it to the customer without any charge.

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Warnings

Read and adhere to all warnings, cautions, and notices in this guide and the documentation supplied with the chassis, power supply, and accessory modules. If the instructions for the chassis and power supply are inconsistent with these instructions or the instructions for accessory modules, contact the supplier to find out how you can ensure that your computer meets safety and regulatory requirements.

Cautions

Electrostatic discharge (ESD) can damage system components. Do the described procedures only at an ESD workstation. If no such station is available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

Safety Information

Before installing and using the device, note the following precautions:

- Read all instructions carefully.
- Do not place the unit on an unstable surface, cart, or stand.
- Follow all warnings and cautions in this manual.
- When replacing parts, ensure that your service technician uses parts specified by the manufacturer.
- Avoid using the system near water, in direct sunlight, or near a heating device.
- The load of the system unit does not solely rely for support from the rackmounts located on the sides. Firm support from the bottom is highly necessary in order to provide balance stability.
- The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Installation Recommendations

Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.

Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:

- A Philips screwdriver
- A flat-tipped screwdriver
- A grounding strap
- An anti-static pad

Using your fingers can disconnect most of the connections. It is recommended that you do not use needlenose pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.

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Safety Precautions

- Read these safety instructions carefully.
- Keep this User Manual for later reference.
- Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
- Keep this equipment away from humidity.
- Put this equipment on a stable surface during installation. Dropping it or letting it fall may cause damage.
- Do not leave this equipment in either an unconditioned environment or in a above 40°C storage temperature as this may damage the equipment.
- The openings on the enclosure are for air convection to protect the equipment from overheating. DO NOT COVER THE OPENINGS.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Place the power cord in a way so that people will not step on it. Do not place anything on top of the power cord. Use a power cord that has been approved for use with the product and that it matches the voltage and current marked on the product's electrical range label. The voltage and current rating of the cord must be greater than the voltage and current rating marked on the product.
- All cautions and warnings on the equipment should be noted.
- If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
- Never pour any liquid into an opening. This may cause fire or electrical shock.
- Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
- If one of the following situations arises, get the equipment checked by service personnel:
  a. The power cord or plug is damaged.
  b. Liquid has penetrated into the equipment.
  c. The equipment has been exposed to moisture.
  d. The equipment does not work well, or you cannot get it to work according to the user's manual.
  e. The equipment has been dropped and damaged.
  f. The equipment has obvious signs of breakage.
- Do not place heavy objects on the equipment.
- The unit uses a three-wire ground cable which is equipped with a third pin to ground the unit and prevent electric shock. Do not defeat the purpose of this pin. If your outlet does not support this kind of plug, contact your electrician to replace your obsolete outlet.
- CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
- The computer is provided with CD drives that comply with the appropriate safety standards including IEC 60825.

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Technical Support and Assistance

1. For the most updated information of NEXCOM products, visit NEXCOM's website at www.nexcom.com.

2. For technical issues that require contacting our technical support team or sales representative, please have the following information ready before calling:
   - Product name and serial number
   - Detailed information of the peripheral devices
   - Detailed information of the installed software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wordings of the error messages

Warning!

1. Handling the unit: carry the unit with both hands and handle it with care.

2. Maintenance: to keep the unit clean, use only approved cleaning products or clean with a dry cloth.

3. CompactFlash: Turn off the unit's power before inserting or removing a CompactFlash storage card.

Conventions Used in this Manual

Warning:
Information about certain situations, which if not observed, can cause personal injury. This will prevent injury to yourself when performing a task.

Caution:
Information to avoid damaging components or losing data.

Note:
Provides additional information to complete a task easily.

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Package Contents

Before continuing, verify that the VTC 7220-R series package that you received is complete. Your VTC 7220-R series package should have all the items listed in the following table.

Item	P/N	Name	Specification	Qty
1	603LAN0011X00	External M12(8P) LAN connector	LTW12-08BMMA-SL8001 Waterproof	2
2	60233PW244X00	External DC Input (4P) cable	ST:BB-04PMMS-LC7001 Waterproof, L = 40mm	1
3	4NCPM01601X00	Terminal Blocks 2x8 ANYTEK:KD161051A000G	3.5mm Male 16P 180D Plug Green	1
4	50311F0110X00	(H)Flat Head Screw Long FEI:F3x5ISO+NYLOK NIGP	F3x5 NI Nylok	1
5	60233SAM05X00	GPS Antenna Arknav:A-130 GPS Antenna 5M SMA180P R1 L3	For VTC 5M/SMA180P	1
6	602DCD1060H00	(N)VTC7220-R Series DVD Driver VER:1.0	JCL	1

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Ordering Information

The following provides ordering information for VTC 7220-R series.

- **VTC 7220-RA (P/N: 10V00722001X0)**
  Intel® Core™ processor i7-4650U, 1.7GHz dual core CPU, Industrial Grade 2GB DDR3L SO-DIMM, VGA/DP output, 2x M12 LAN, 2x RS-232, 1x RS-232/422/485, 8x GPIO, 3x USB, 24VDC Input
- **VTC 7220-RB (P/N: 10V00722002X0)**
  Intel® Core™ processor i7-4650U, 1.7GHz dual core CPU, Industrial Grade 2GB DDR3L SO-DIMM, VGA/DP output, 2x M12 LAN, 2x RS-232, 1x RS-232/422/485, 8x GPIO, 3x USB, 36VDC Input
- **VTC 7220-RC (P/N: TBD)**
  Intel® Core™ processor i7-4650U, 1.7GHz dual core CPU, Industrial Grade 2GB DDR3L SO-DIMM, VGA/DP output, 2x M12 LAN, 2x RS-232, 1x RS-232/422/485, 8x GPIO, 3x USB, 48VDC Input
- **VTC 7220-RF (P/N: 10V00722003X0)**
  Intel® Core™ processor i7-4650U, 1.7GHz dual core CPU, Industrial Grade 2GB DDR3L SO-DIMM, VGA/DP output, 2x M12 LAN, 2x RS-232, 1x RS-232/422/485, 8x GPIO, 3x USB, 110VDC Input

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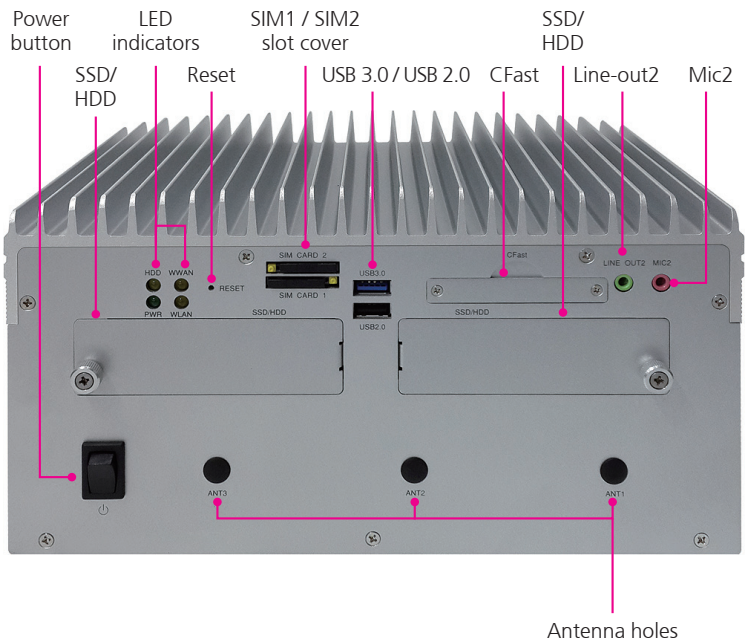
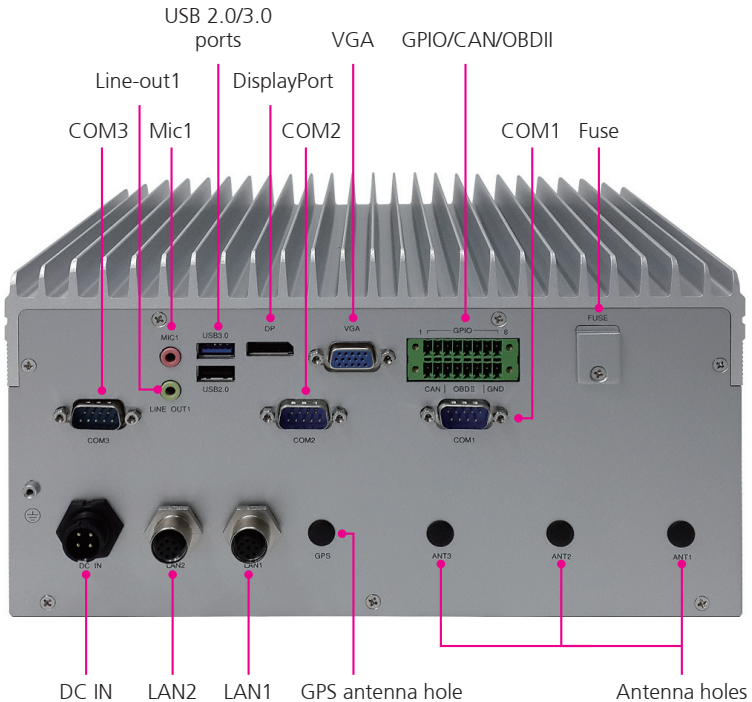
Chapter 1: Product Introduction

Physical Features

Front View



Rear View



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Overview

VTC 7220-R series features powerful new generation Intel® Core™ processor i7-4650U. Its CPU performance gives the users the ability to adapt to what they need in any telematics applications. Its Intel® HD graphics 5000 engine allows users to fully take advantage of VTC 7220-R series to achieve smooth, seamless and stunning graphic performance on 3 different video outputs (VGA, DP, LVDS). VTC 7220-R series is equipped with 2 externally accessible SSD/HDD trays; users can easily download or upload the data on other devices by just removing the storage devices from VTC 7220-R series. By integrating the variety of I/O ports and 4x Mini-PCIe sockets expansibility, VTC 7220-R series is not only suitable for video surveillance application, but also can meet the demand for other telematics applications, such as infotainment, and dispatching system. With dual SIM cards support, VTC 7220-R series allows three SIM cards backup each other for a better connectivity quality by software. In addition, three SIM cards + dual WWAN modules architecture can increase the bandwidth for a faster data transfer speed. Not only data transmission, VTC 7220-R series also supports two-way voice communication. Equipped with intelligent power management, VTC 7220-R series can be waked on by ignition, RTC timer or SMS/Ring remotely.

Key Features

- Intel® Core™ processor dual core i7-4650U
- Three SIM cards + dual WWAN modules support
- Dual externally accessible SATA 3.0 SSD/HDD
- Built-in U-blox UBX-NEO M8N GPS, optional UBX-NEO M8L Dead Reckoning support
- Built-in CAN 2.0B. Optional OBDII/CAN2.0B Module (SAE J1939)
- Wake on RTC/SMS via WWAN module
- Voice communication via WWAN module
- Compliant with MIL-STD-810G
- 4x mini-PCIe socket rich expansion capability
- EN50155 certification
- Isolated power supply

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Hardware Specifications

CPU

- Intel® Core™ processor dual core i7-4650U, 1.7GHz

Memory

- 2 channel 204-pin DDR3L SO-DMIM socket support 1333/1600MHz up to 16GB, default 2GB.

Storage

- 2x 2.5" SATA 3.0 SSD/HDD (externally accessible). RAID 0,1 supported. Optional lockable storage available
- 1x CFast (externally accessible)

Expansion

- 1x full size Mini-PCIe socket (USB 2.0)
- 1x full size Mini-PCIe socket (USB 2.0 + PCIe)
- 1x full size Mini-PCIe socket (USB 2.0 + PCIe)
- 1x half size Mini-PCIe socket (USB 2.0 + PCIe)

Function

- 1x default uBlox-M8N GPS module (72-channel, GALILEO & GLONASS), optional with Dead Reckoning support
- Built-in G-sensor

I/O Interface-Front

- 4x LED for power, storage, WWAN, WLAN
- 2x externally accessible SATA 3.0 SSD/HDD tray, RFID 0, 1 supported (optional lockable storage available)
- 1x dual USB type A connector for USB 3.0 port + USB 2.0 port
- 2x externally accessible SIM card socket (selectable)
- 1x phone jack 3.5mm for 1x Mic-In
- 1x phone jack 3.5mm for 1x Line-Out
- 1x externally accessible CFast card socket with cover
- 1x reset button
- 3x antenna hole for WWAN/WLAN/BT

I/O Interface-Rear

- 1x Isolated DC Input with ignition and 37W typical power consumption (optional 24/36/48/110 VDC)
- 1x dual USB type A connector for USB 3.0 port + USB 2.0 port
- 2x M12 10/100/1000 Fast Ethernet
- 1x phone jack 3.5mm for 1x Mic-In
- 1x phone jack 3.5mm for 1x Line-Out with 1.5W output each
- 1x DB-15 VGA. Resolution up to 2560 x 1600 @60Hz
- 1x DP port. Resolution up to 2560 x 1600 @60Hz
- 2x DB-9 RS-232
- 1x DB-9 RS-232/422/485 (RI/5V/12V selectable)
- 2x MCU-DI and 2x MCU-DO
- 1x 16-pin terminal block
  - 1x CAN Bus 2.0B (on board)
  - 1x optional OBDII/CAN2.0 module (SAE J1939)
  - 8x programmable GPIO
    (Digital Input)
    Input voltage (internal type): 5VDC TTL (default)
    Input voltage (source type): 3~12VDC
    (Digital Output)
    Digital Output (sink type): 5VDC TTL (default), max current: 20mA
    Digital Output (source type): 3~24VDC, max current: 150mA
- 4x antenna hole for WWAN/ WLAN/ BT/GPS
- 1x Fuse (15A)

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Power Management

- Selectable boot-up & shut-down voltage for low power protection by software
- Setting 8-level power on/off delay time by software
- Status of ignition and low voltage can be detected by software
- Support S3/S4 suspend mode

Operating System

- Windows 8, WES8
- Window 7, WES7
- Linux kernel 3.X

Dimensions

- 260 mm (W) x 206 mm (D) x 137.5 mm (H) (10.24" x 8.11" x 5.41")
- Weight: 2.5kg

Environment

- Operating temperatures:
  - 40°C to 70°C (w/ industrial SSD) with air flow
  - 20°C to 45°C (w/ commercial HDD) with air flow
- Storage temperatures: -35°C to 85°C
- Relative humidity: 10% to 90% (non-condensing)

Standards/Certifications

- CE approval
- FCC Class A
- EN50155 Certification
  - Ambient Temperature EN 50155 TX (-40 ~ 70° C)
  - Shock and Vibration IEC 61373 class B
  - Interruptions of Voltage Supply Class S1, S2
  - Supply Change Over Class C1, C2
  - EMC EN 50121-3-2

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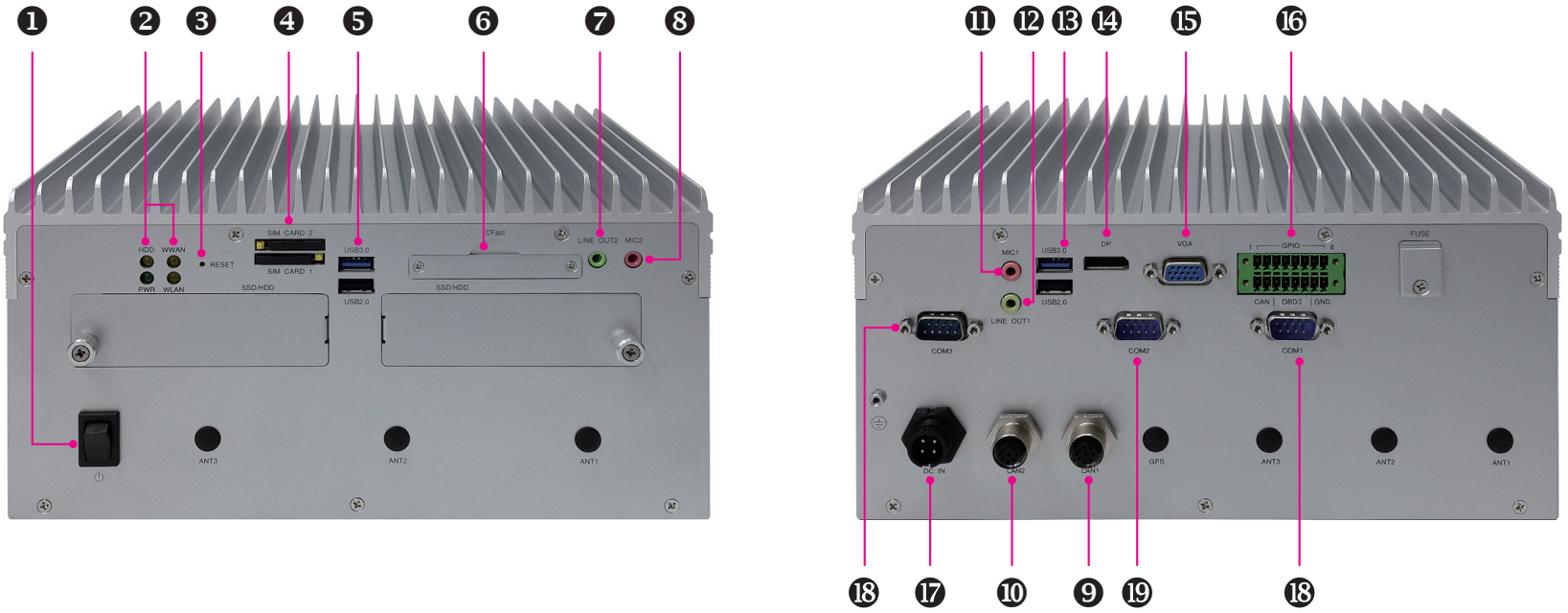
Connector Numbering

The following diagrams indicate the numbers of the connectors. Use these numbers to locate the connectors' respective pinout assignments on chapter 2 of the manual.



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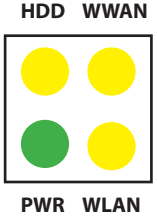
Chapter 2: External Connectors Pinout Description

Power Button

Connector Number: 1

LED Indicators (HDD, WWAN, Power & WLAN)

Connector Number: 2



LED	LED Behavior
HDD	Light On: HDD/SSD Active
PWR	Light On: Power On Light Off: Power Off
WWAN	Blinking: Active
WLAN	Blinking: Active

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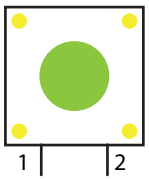
Reset

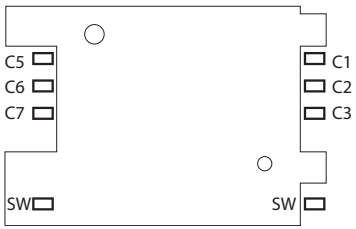
Connector Number: 3



Pin	Definition
1	GND
2	RESET

SIM1 and SIM2 Sockets For CN23 and CN21

Connector Number: 4



SIM 1

Pin	Definition	Pin	Definition
C1	SIM PWR	C5	GND
C2	SIM RST	C6	NC
C3	SIM CLK	C7	SIM DAT
SW1	NC	SW2	NC

SIM 2

Pin	Definition	Pin	Definition
C1	SIM PWR	C5	GND
C2	SIM RST	C6	NC
C3	SIM CLK	C7	SIM DAT
SW1	NC	SW2	NC

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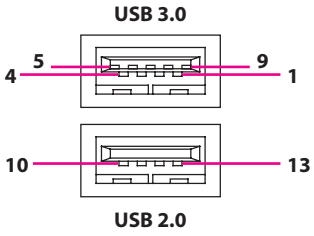
USB 3.0 and USB 2.0 Ports (Front)

Connector Number: 5



USB 3.0 Pin Connector Definition

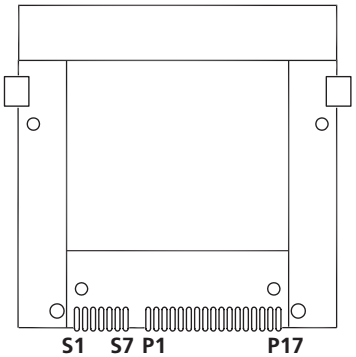
Pin	Definition	Pin	Definition
1	VCC	2	USB0_N
3	USB0_P	4	GND
5	USB3_RXN	6	USB3_RXP
7	GND	8	USB3_TXN
9	USB3_TXP		

USB 2.0 Pin Connector Definition

Pin	Definition	Pin	Definition
10	VCC	11	USB1_N
12	USB1_P	13	GND

CFast

Connector Number: 6



Pin	Definition	Pin	Definition
S1	GND	PC6	NC
S2	SATA2_TXP	PC7	GND
S3	SATA2_TXN	PC8	CFAST_LED1
S4	GND	PC9	CFAST_LED2
S5	SATA2_RXN	PC10	NC
S6	SATA2_RXP	PC11	NC
S7	GND	PC12	NC
PC1	CFAST_CDI	PC13	NC
PC2	GND	PC14	NC
PC3	NC	PC15	GND
PC4	NC	PC16	GND
PC5	NC	PC17	CFAST_CDO

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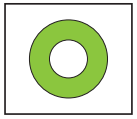
Line-out2

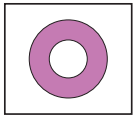
Connector Number: 7



Pin	Definition	Pin	Definition
1	Headphone (mono)	2	Detect
3	NC	4	Headphone (mono)
5	GND	6	GND

Mic2

Connector Number: 8



Pin	Definition	Pin	Definition
1	NC	2	Detect
3	NC	4	Mic-In (Right Channel) to WWAN module
5	GND	6	GND

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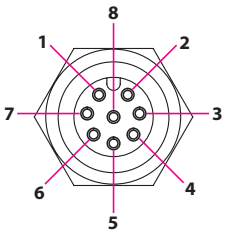
LAN1 Port

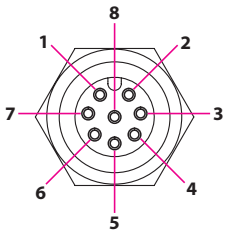
Connector Number: 9



Pin	Definition	Pin	Definition
1	DA+	2	DA-
3	DB+	4	DB-
5	DC+	6	DC-
7	DD+	8	DD-

LAN2 Port

Connector Number: 10



Pin	Definition	Pin	Definition
1	DA+	2	DA-
3	DB+	4	DB-
5	DC+	6	DC-
7	DD+	8	DD-

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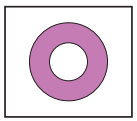
Mic1

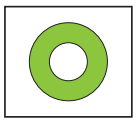
Connector Number: 11



Pin	Definition	Pin	Definition
1	GND	2	Mic-In (Left Channel)
3	GND	4	Detect
5	NC	6	

Line-out1

Connector Number: 12



Pin	Definition	Pin	Definition
22	Left Channel	23	GND
24	Detect	25	Right Channel

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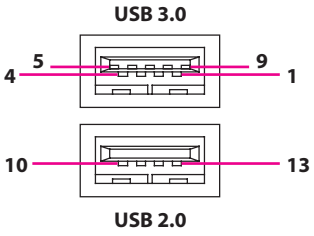
USB 3.0 and USB 2.0 Ports (Rear)

Connector Number: 13



USB 3.0 Pin Connector Definition

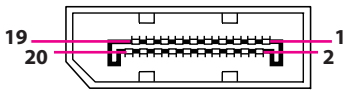
Pin	Definition	Pin	Definition
1	VCC	2	USB0_N
3	USB0_P	4	GND
5	USB3_RXN	6	USB3_RXP
7	GND	8	USB3_TXN
9	USB3_TXP		

USB 2.0 Pin Connector Definition

Pin	Definition	Pin	Definition
10	VCC	11	USB1_N
12	USB1_P	13	GND

DisplayPort

Connector Number: 14



Pin	Definition	Pin	Definition
1	DAT0_P	2	GND
3	DAT0_N	4	DAT1_P
5	GND	6	DAT1_N
7	DAT2_P	8	GND
9	DAT2_N	10	DAT2_N
11	GND	12	DAT3_N
13	DP_AUX_EN#	14	GND
15	AUX_P_CCLK	16	GND
17	AUX_N_CDAT	18	HPD
19	GND	20	VCC3

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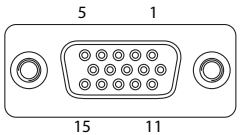
VGA

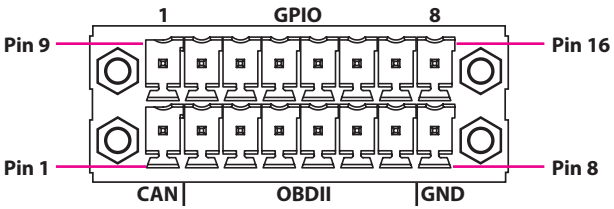
Connector Number: 15



Pin	Definition	Pin	Definition
1	RED	2	GREEN
3	BLUE	4	CH7517_SPC
5	GND	6	M_DET
7	VGA_GND	8	VGA_GND
9	VGA_VCC	10	GND
11	CH7517_SPD	12	VGA_DAT
13	VGA_HS	14	VGA_VS
15	VGA_CLK		

GPIO/CAN/OBDII

Connector Number: 16



Pin	Definition	Pin	Definition
1	CAN2.0 SJA1000_H	9	GPIO1 (Default: GPI1)
2	CAN2.0 SJA1000_H	10	GPIO2 (Default: GPI2)
3	VIOB-CAN03-CAN2.0_L	11	GPIO3 (Default: GPI3)
4	VIOB-CAN03-CAN2.0_H	12	GPIO4 (Default: GPI4)
5	VIOB-CAN03-J1939_L	13	GPIO5 (Default: GPO1)
6	VIOB-CAN03-J1939_H	14	GPIO6 (Default: GPO2)
7	GND	15	GPIO7 (Default: GPO3)
8	GND	16	GPIO8 (Default: GPO4)

GPIO can be programmed by S/W.
Please refer to the source code in utility.

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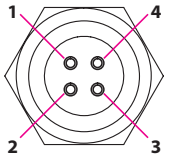
DC Input (24/36/110VDC)

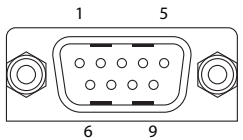
Connector Number: 17



Pin	Definition
1	DC In+
2	DC In-
3	Ignition
4	DC In-

COM1 and COM3

Connector Number: 18



Pin	Definition	Pin	Definition
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

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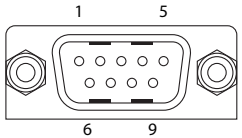
COM2 (RS232/422/485)

Connector Number: 19
RS232 / RS422 / RS485 is selected in BIOS setting



RS232 (Default)

Pin	Definition	Pin	Definition
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

RS422/485

Pin	Definition	Pin	Definition
1	TXD-	2	TXD+
3	RXD-	4	RXD+

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Chapter 3: Jumpers and Switches

This chapter describes how to set the jumpers on the VTC 7220-R series motherboard.

Before You Begin

- Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.
- Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:
  - A Philips screwdriver
  - A flat-tipped screwdriver
  - A set of jewelers screwdrivers
  - A grounding strap
  - An anti-static pad
- Using your fingers can disconnect most of the connections. It is recommended that you do not use needle-nosed pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.
- Before working on internal components, make sure that the power is off. Ground yourself before touching any internal components, by touching a metal object. Static electricity can damage many of the electronic components. Humid environment tend to have less static electricity than dry environments. A grounding strap is warranted whenever danger of static electricity exists.

Precautions

Computer components and electronic circuit boards can be damaged by discharges of static electricity. Working on the computers that are still connected to a power supply can be extremely dangerous.

Follow the guidelines below to avoid damage to your computer or yourself:

- Always disconnect the unit from the power outlet whenever you are working inside the case.
- If possible, wear a grounded wrist strap when you are working inside the computer case. Alternatively, discharge any static electricity by touching the bare metal chassis of the unit case, or the bare metal body of any other grounded appliance.
- Hold electronic circuit boards by the edges only. Do not touch the components on the board unless it is necessary to do so. Don't flex or stress the circuit board.
- Leave all components inside the static-proof packaging that they shipped with until they are ready for installation.
- Use correct screws and do not over tighten screws.

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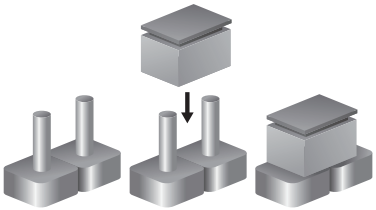
Jumper Settings

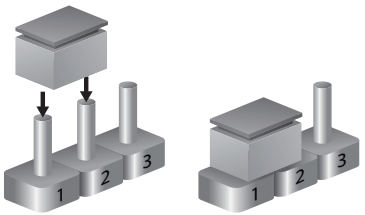
A jumper is the simplest kind of electric switch. It consists of two metal pins and a cap. When setting the jumpers, ensure that the jumper caps are placed on the correct pins. When the jumper cap is placed on both pins, the jumper is short. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is open.

Refer to the illustrations below for examples of what the 2-pin and 3-pin jumpers look like when they are short (on) and open (off).

Two-Pin Jumpers: Open (Left) and Short (Right)



Three-Pin Jumpers: Pins 1 and 2 are Short



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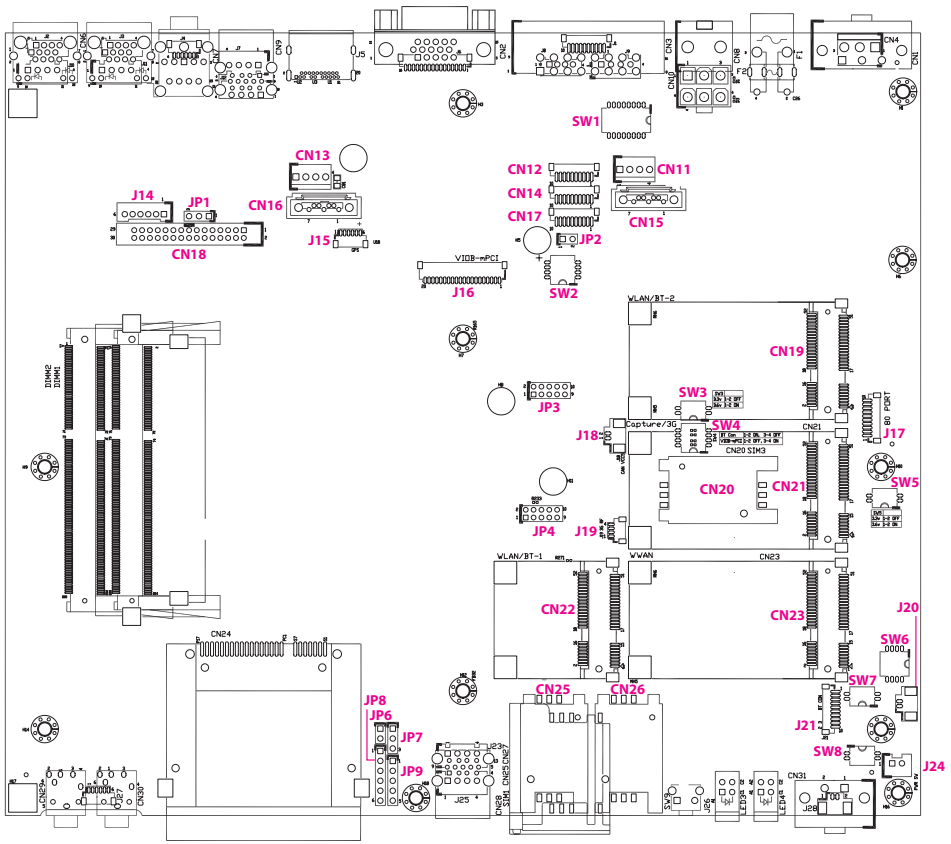
VTC 7220-R Series Connector Specification & Jumper Setting

VTC 7220-R series carrier board placement

The figure below is the carrier board used in the VTC 7220-R series. It shows the locations of the jumpers and connectors.



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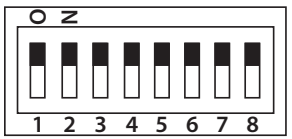
DIP Switch Settings

GPIO Pull High Switch

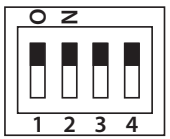
Connector location: SW1



SW	On (Default)	Off
SW1.1	Pull up VCC5	Don't care
SW1.2	Pull up VCC5	Don't care
SW1.3	Pull up VCC5	Don't care
SW1.4	Pull up VCC5	Don't care
SW1.5	Pull up VCC5	Don't care
SW1.6	Pull up VCC5	Don't care
SW1.7	Pull up VCC5	Don't care
SW1.8	Pull up VCC5	Don't care

COM2 RI Switch

Connector location: SW2



Function	Definition
RI (*)	1,2,4 OFF / 3 ON
VCC5	1,3,4 OFF / 2 ON
VCC12	2,3,4 OFF / 1 ON

(*) Default setting

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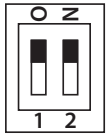
VCC Selection Switch for CN23 Mini-PCIe Socket

Connector location: SW3



Function	Definition
CN21 3.3V (*)	1-2 OFF
CN21 3.6V	1-2 ON

(*) Default setting

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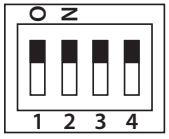
WWAN Module Selector (For Wake-Up & Voice Functions on Mini-PCIe CN23)

Connector location: SW6



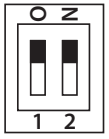
	WWAN HE910 Wake-Up & Voice	WWAN CM8000 Wake-Up & Voice *	WWAN MC8090/8092
SW6.1	Off	On	Off
SW6.2	Off	Off	On
SW6.3	On	Off	Off
SW6.4	Off	On	Off
Digital Voice**	HE910 (I2S)	Disabled (default)	MC8090(PCM)

*Default Settings

**Digital voice is selectable in BIOS.

ME/RTC Clear Switch

Connector location: SW7



Function	Definition
Clear CMOS/ME	1-2 ON
Normal	1-2 OFF

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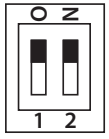
Input Voltage Control Switch

Connector location: SW8



Function	Definition
12V	1-2 OFF
24V	1 OFF, 2 ON
9-36V	1-2 ON (Default)

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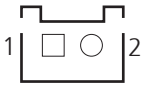
Connectors

Power SW Connector

Connector size: 1 x 2 = 2-pin header (2.5mm)
Connector location: J24



Pin	Definition
1	HW_PWRBT
2	GND

GLA Flash Connector

Connector size: 1 x 6 = 6-pin header (2.54mm)
Connector location: JP8

Pin	Definition	Pin	Definition
1	VCC3	2	GND
3	TCK	4	TDO
5	TDI	6	TMS

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MCU Debug COM Connector

Connector size: 1 x 3 = 3-pin header (2.54mm)
Connector location: JP7

Pin	Definition
1	TX
2	RX
3	GND

MCU Flash Connector

Connector size: 1 x 5 = 5-pin header (2.54mm)
Connector location: JP9

Pin	Definition	Pin	Definition
1	VCC3	2	C2D
3	MRST	4	C2CK
5	GND		

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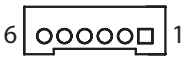
MCU Temp Sensor

Connector size: 1 x 2 = 2-pin header (2.54mm)
Connector location: JP6

Pin	Definition
1	Temp Sensor
2	GND

LVDS BL Control Connector

Connector size: 1 x 6 = 6-pin header (2.00mm)
Connector location: J14



Pin	Definition	Pin	Definition
1	Panel_backlight	2	Panel_VDD
3	GND	4	GND
5	LVDS_PANEL	6	L_BKLT_CTRL

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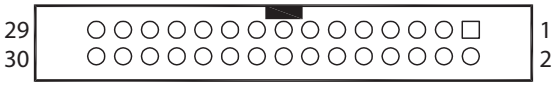
LVDS Connector

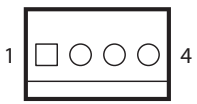
Connector size: 2 x 15 = 30-pin header (2.0mm)
Connector location: CN18



Pin	Definition	Pin	Definition
1	LVDS_DDC_CLK	2	LVDS_DDC_DATA
3	Panel_VDD	4	LVDSA_DATA0
5	LVDSA_DATA3	6	LVDSA_DATA#0
7	LVDSA_DATA#3	8	Panel_VDD
9	LVDS_GND	10	LVDS_GND
11	LVDSA_CLK	12	LVDSA_CLK
13	LVDSA_CLK#	14	LVDSA_DATA#1
15	LVDS_GND	16	LVDS_GND
17	LVDSA_DATA2	18	Panel_backlight
19	LVDSA_DATA#2	20	Panel_backlight
21	LVDS_GND	22	MCU_PWRBTN#
23	USBHUB_2_N	24	LVDS_DET#
25	USBHUB_2_P	26	LVDS_USB_PWR
27	USB_GND	28	USB_GND
29	Panel_backlight	30	GND

SATA Power Connectors

Connector size: 1 x 4 = 4-pin header (2.54mm)
Connector location: CN13 and CN11



Pin	Definition	Pin	Definition
1	VCC12	2	GND
3	GND	4	VCC5

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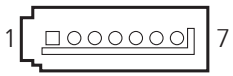
SATA Connectors

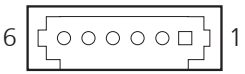
Connector size: 1 x 7 = 7-pin header (1.27mm)
Connector location: CN16 and CN15



Pin	Definition	Pin	Definition
1	GND	2	SATA1/0_TXP
3	SATA1/0_TXN	4	GND
5	SATA1/0_RXN	6	SATA1/0_RXP
7	GND		

GPS Connector

Connector size: 1 x 6 = 6-pin header (1.0mm)
Connector location: J15



Pin	Definition	Pin	Definition
1	GPS_BAT	2	GPS_LED#
3	GPS_TX	4	GPS_RX
5	GND	6	VCC3_GPS

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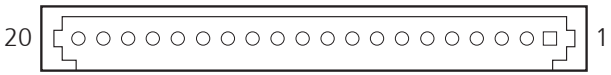
Expansion Connector (For VIOB-mPCI expansion card)

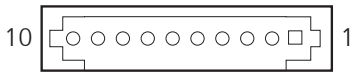
Connector size: 1 x 20 = 20-pin header (1.0mm)
Connector location: J16



Pin	Definition	Pin	Definition
1	GND	2	USBHUB_3_P1
3	USBHUB_3_N1	4	GND
5	PEX_B_TX5P	6	PEX_B_TX5N
7	GND	8	PEX_B_RX5P
9	PEX_B_RX5N	10	GND
11	SMB_DATA	12	SMB_CLK
13	CB_RESET#_B	14	EXP_DISABLE#
15	GND	16	GND
17	MINI_CLKP4	18	MINI_CLKN4
19	GND	20	NC

COM1/3 RS232 Connector

Connector size: 1 x 10 = 10-pin header (1.0mm)
Connector location: CN12 and CN17



Pin	Definition	Pin	Definition
1	GND	2	GND
3	CTS	4	DSR
5	DTR	6	RXD
7	RI	8	RTS
9	TXD	10	DCD

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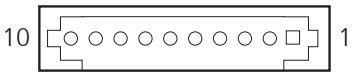
COM2 RS232/422/485 Connector

Connector size: 1 x 10 = 10-pin header (1.0mm)
Connector location: CN14



RS232

Pin	Definition	Pin	Definition
1	GND	2	GND
3	CTS	4	DSR
5	DTR_RX-	6	RXD_TX+
7	RI_PWR	8	RTS
9	TXD_RX+	10	DCD_TX-

RS485

Pin	Definition	Pin	Definition
6	DATA+	10	DATA-

RS422

Pin	Definition	Pin	Definition
5	RX-	6	TX+
9	RX+	10	TX-

Super I/O Temperature Sensor

Connector size: 1 x 2 = 2-pin header (2.54mm)
Connector location: JP2

Pin	Definition
1	Temp
2	GND

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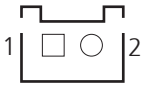
RTC Battery Connector

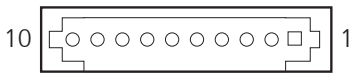
Connector size: 1 x 2 = 2-pin header (1.25mm)
Connector location: J20



Pin	Definition
1	GND
2	RTC_BAT

Debug 80 Port Connector

Connector size: 1 x 10 = 10-pin header (1.0mm)
Connector location: J17



Pin	Definition	Pin	Definition
1	GND	2	PCIRST#
3	33M_CLK	4	LPC_FRAME#
5	LPC_AD3	6	LPC_AD2
7	LPC_AD1	8	LPC_AD0
9	VCC3	10	VCC3

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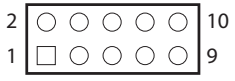
Optional VIOB-CAN03 Module Connector

Connector size: 2 x 5 = 10-pin header (2.0mm)
Connector location: JP3 and JP4



JP3 Output

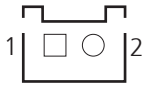
Pin	Definition	Pin	Definition
1	NC	2	NC
3	NC	4	NC
5	GND	6	GND
7	VIOB-CAN03-J1939_L	8	VIOB-CAN03-CAN2.0_L
9	VIOB-CAN03-J1939_H	10	VIOB-CAN03-CAN2.0_H

JP4 Input

Pin	Definition	Pin	Definition
1	NC	2	VCC5
3	NC	4	NC
5	GND	6	GND
7	CAN_DI	8	CAN_DO
9	RXD5	10	TXD5

Power Connector for CAN 2.0B MiniCard (MPX-2515)

Connector size: 1 x 2 = 2-pin header (1.25mm)
Connector location: J18



Pin	Definition
1	VCC5
2	GND

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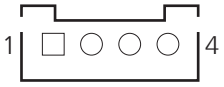
3G GPS RF Connector

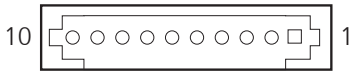
Connector size: 1 x 4 = 4-pin header (1.0mm)
Connector location: J19



Pin	Definition	Pin	Definition
1	RF_VCC3	2	RF_BY_PASS1
3	RF_BY_PASS2	4	GND

BT Connector

Connector size: 1 x 10 = 10-pin header (1.0mm)
Connector location: J21



Pin	Definition	Pin	Definition
1	GND	2	NC
3	VCC3	4	NC
5	BT_AUDIO_EN	6	NC
7	NC	8	USBHUB_3-N
9	USBHUB_3-P	10	GND

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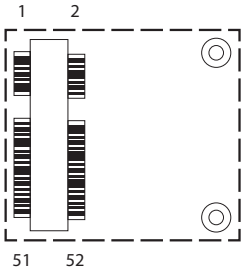
Mini-PCIe (PCIe + USB)

Connector location: CN22



Pin	Definition	Pin	Definition
1	WAKE#	2	+V3.3_MINI1
3	NC	4	GND
5	NC	6	+V1.5S_MINI1
7	NC	8	NC
9	GND	10	NC
11	PCIE_CLK#	12	NC
13	PCIE_CLK	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	WLAN_DIS#
21	GND	22	RESET#
23	PCIE_RX_N	24	+V3.3_MINI1
25	PCIE_RX_P	26	GND

Pin	Definition	Pin	Definition
27	GND	28	+V1.5S_MINI1
29	GND	30	SMBCLK
31	PCIE_TX_N	32	SMBDAT
33	PCIE_TX_P	34	GND
35	GND	36	USB-
37	GND	38	USB+
39	+V3.3_MINI1	40	GND
41	+V3.3_MINI1	42	NC
43	GND	44	WLAN_LED#
45	PCH_CL_CLK	46	WPAN_LED#
47	PCH_CL_DAT	48	+V1.5S_MINI1
49	PCH_CL_RST#	50	GND
51	MINI_BT_DIS#	52	+V3.3_MINI1

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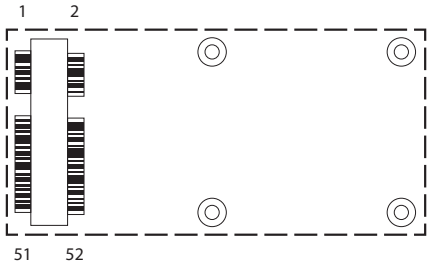
Mini-PCIe (PCIe + USB)

Connector location: CN19



Pin	Definition	Pin	Definition
1	WAKE#	2	+V3.3_MINI3
3	NC	4	GND
5	NC	6	+V1.5S_MINI3
7	NC	8	NC
9	GND	10	NC
11	PCIE_CLK#	12	NC
13	PCIE_CLK	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	WLAN_DIS#
21	GND	22	RESET#
23	PCIE_RX_N	24	+V3.3_MINI3
25	PCIE_RX_P	26	GND

Pin	Definition	Pin	Definition
27	GND	28	+V1.5S_MINI3
29	GND	30	SMBCLK
31	PCIE_TX_N	32	SMBDAT
33	PCIE_TX_P	34	GND
35	GND	36	USB-
37	GND	38	USB+
39	+V3.3_MINI3	40	GND
41	+V3.3_MINI3	42	WWAN_LED#
43	GND	44	WLAN_LED#
45	NC	46	NC
47	NC	48	+V1.5S_MINI3
49	NC	50	GND
51	NC	52	+V3.3_MINI3

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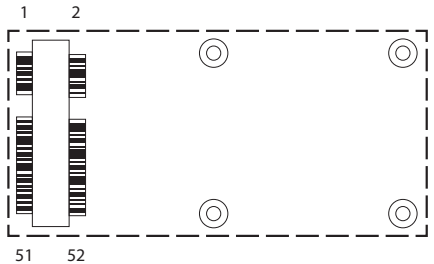
Mini-PCIe (PCIe + USB)

Connector location: CN21
SIM Socket: SIM 2 (default)
SIM Socket: SIM 3



Pin	Definition	Pin	Definition
1	WAKE#	2	+V3.3_MINI2
3	NC	4	GND
5	NC	6	+V1.5S_MINI2
7	NC	8	UIMB_PWR
9	GND	10	UIMB_DAT
11	PCIE_CLK#	12	UIMB_CLK
13	PCIE_CLK	14	UIMB_RST
15	GND	16	NC
17	NC	18	GND
19	NC	20	WLAN_DIS#
21	GND	22	RESET#
23	PCIE_RX_N	24	+V3.3_MINI2
25	PCIE_RX_P	26	GND

Pin	Definition	Pin	Definition
27	GND	28	+V1.5S_MINI2
29	GND	30	SMBCLK
31	PCIE_TX_N	32	SMBDAT
33	PCIE_TX_P	34	GND
35	GND	36	USB-
37	GND	38	USB+
39	+V3.3_MINI2	40	GND
41	+V3.3_MINI2	42	WWAN_LED#
43	GND	44	WLAN_LED#
45	NC	46	NC
47	NC	48	+V1.5S_MINI2
49	NC	50	GND
51	NC	52	+V3.3_MINI2

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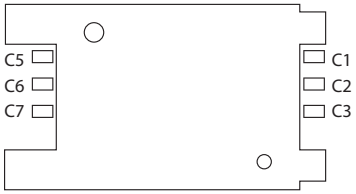
Internal WWAN SIM Card Socket (SIM 3) For CN21

Connector location: CN20



Pin	Definition	Pin	Definition
C1	SIM PWR	C5	GND
C2	SIM RST	C6	NC
C3	SIM CLK	C7	SIM DAT

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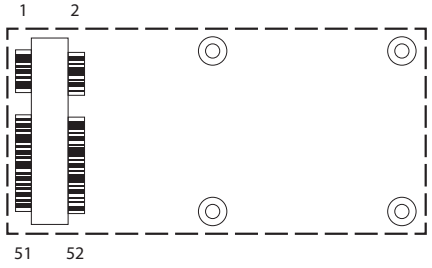
Mini-PCIe (USB)

Connector location: CN23
SIM Socket: SIM 1 (default)
SIM Socket: SIM 2



Pin	Definition	Pin	Definition
1	MIC_P/WAKE_N	2	+V3.3A_MINI4
3	MINI_MIC_N	4	GND
5	MINI_SPK_PRR	6	NC
7	U_GND	8	UIMA_PWR
9	GND	10	UIMA_DAT
11	VCC_MSM26_DIG	12	UIMA_CLK
13	NC	14	UIMA_RST
15	GND	16	NC
17	PCM_TX_C8K	18	GND
19	PCM_SYNC_C8K	20	3.5G_DIS#
21	GND	22	3.5G_RST#
23	NC	24	+V3.3A_MINI4
25	NC	26	GND

Pin	Definition	Pin	Definition
27	GND	28	MC9090_WAKE
29	GND	30	NC
31	NC	32	CM8K_WAKE
33	UMTS_RESET#	34	GND
35	GND	36	USB-
37	GND	38	USB+
39	+V3.3A_MINI4	40	GND
41	+V3.3A_MINI4	42	WWAN_LED#
43	GND	44	NC
45	PCM_CLK	46	NC
47	PCM_RX	48	NC
49	PCM_TX	50	GND
51	PCM_SYNC	52	+V3.3A_MINI4

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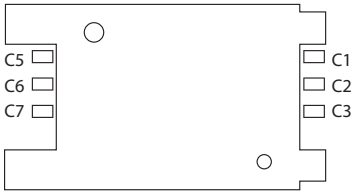
Optional Internal WWAN SIM1 Card Socket For CN23

Connector location: CN25

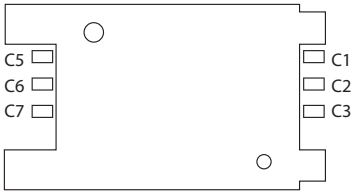


Pin	Definition	Pin	Definition
C1	SIM PWR	C5	GND
C2	SIM RST	C6	NC
C3	SIM CLK	C7	SIM DAT

Please contact sales for further information.

Optional Internal WWAN SIM2 Card Socket For CN21 or CN23

Connector location: CN26



Pin	Definition	Pin	Definition
C1	SIM PWR	C5	GND
C2	SIM RST	C6	NC
C3	SIM CLK	C7	SIM DAT

Please contact sales for further information.

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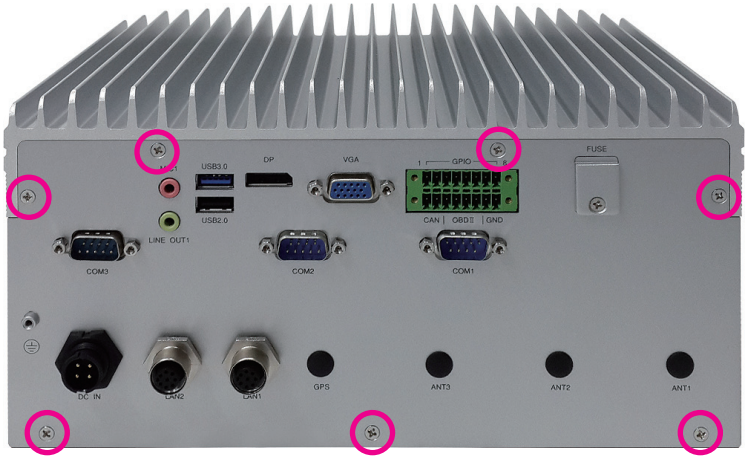
Chapter 4: System Setup

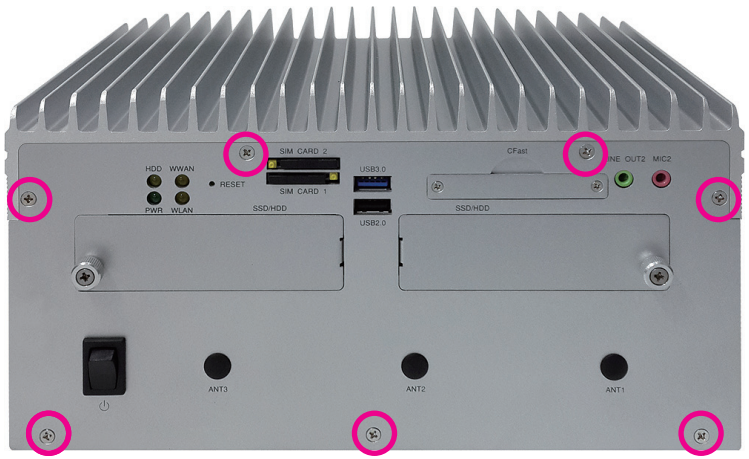
Removing the Chassis Bottom Cover

Prior to removing the chassis cover, make sure the unit's power is off and disconnected from the power sources to prevent electric shock or system damage.

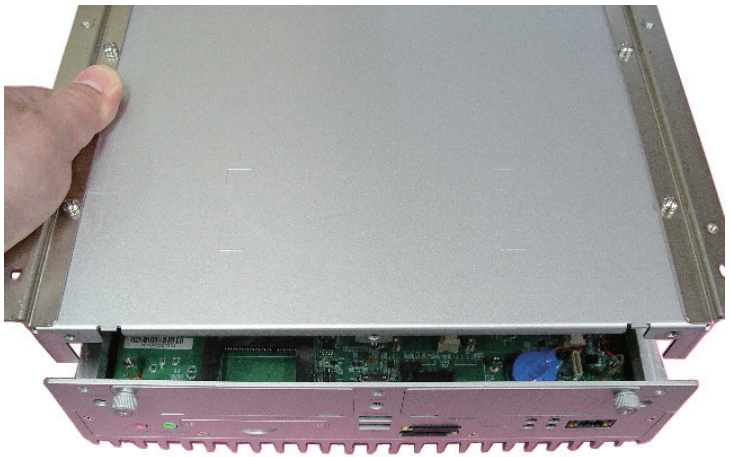
1. The screws circled on the front and the rear are used to secure the bottom cover to the chassis. Remove these screws and put them in a safe place for later use.



Rear View



Front View



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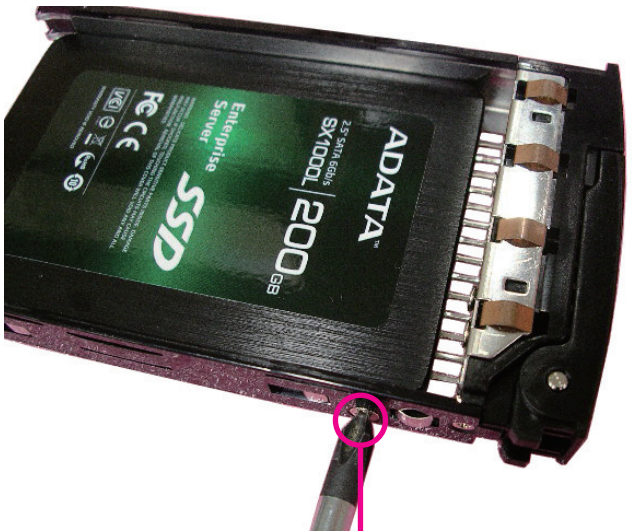
Installing a SSD/HDD Drive

1. The two SSD/HDD bays on the front are used to install 2.5" hard drives. Loosen the thumb screws and remove the covers.

   Note: The following instructions cover how to install a single 2.5" hard drive, but will also outline the steps to install the hard drive brackets for the two SSD/HDD bays.

Thumb screws

2. Insert the hard drive into the drive bay with the SATA data and power connector facing towards the end. Align the hard drive's mounting holes with the mounting holes on the drive bay, and use the provided screws to secure the hard drive in place.



Mounting screws

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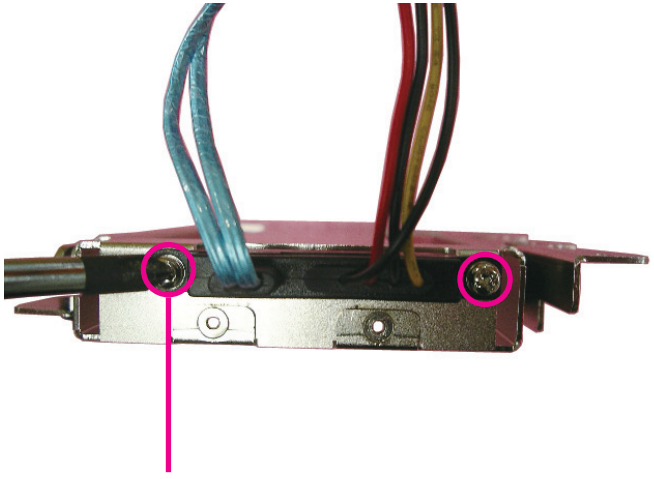
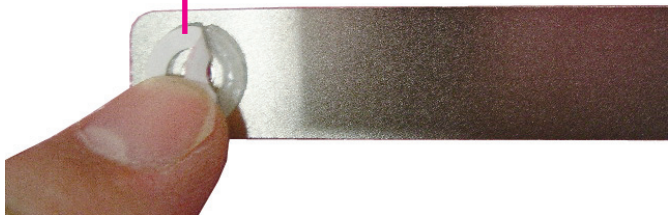
3. Connect the SATA data and power connectors to the two hard drive brackets and screw the connectors in place.



Mounting screws

4. Remove the tape covers on the damper brackets.

Tape cover



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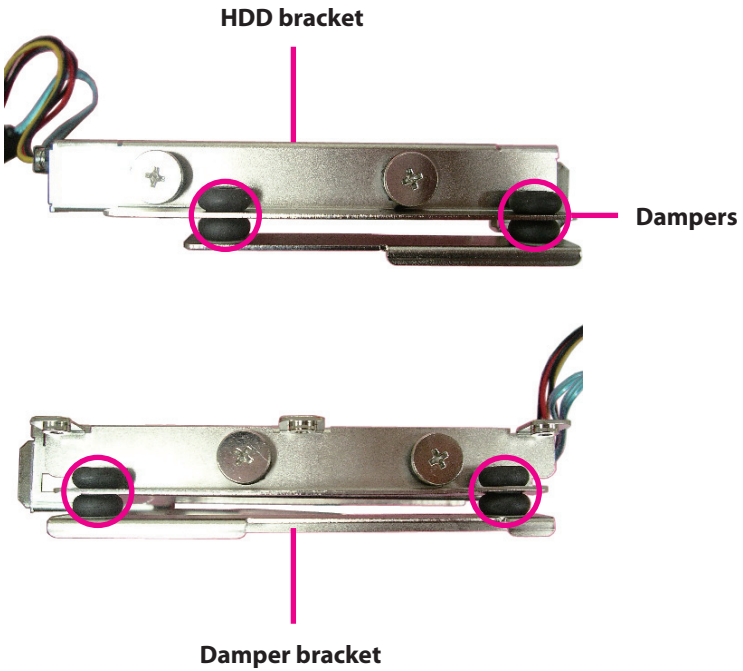
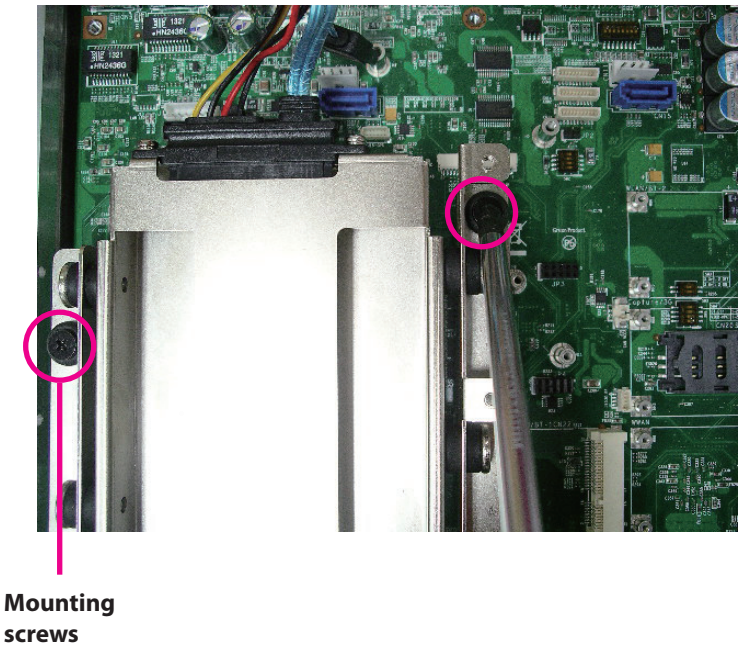
5. Place the dampers onto the damper brackets, then insert the damper brackets into the two hard drive brackets.



6. With the damper brackets secured, install the left hard drive bracket onto the left side of the motherboard and secure the bracket using screws.



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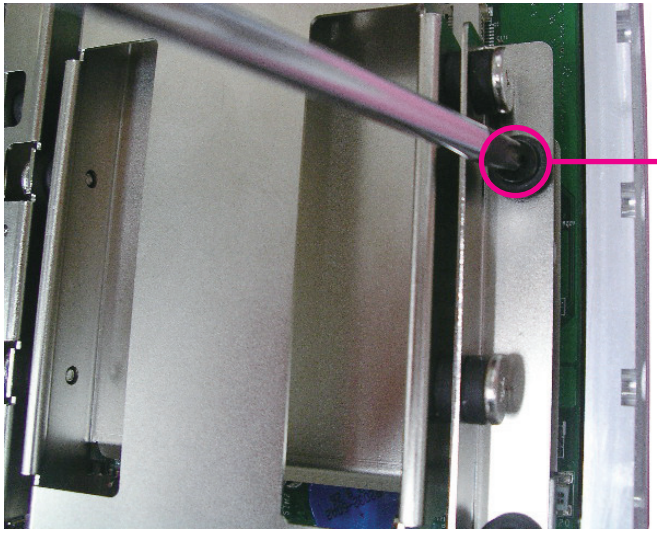
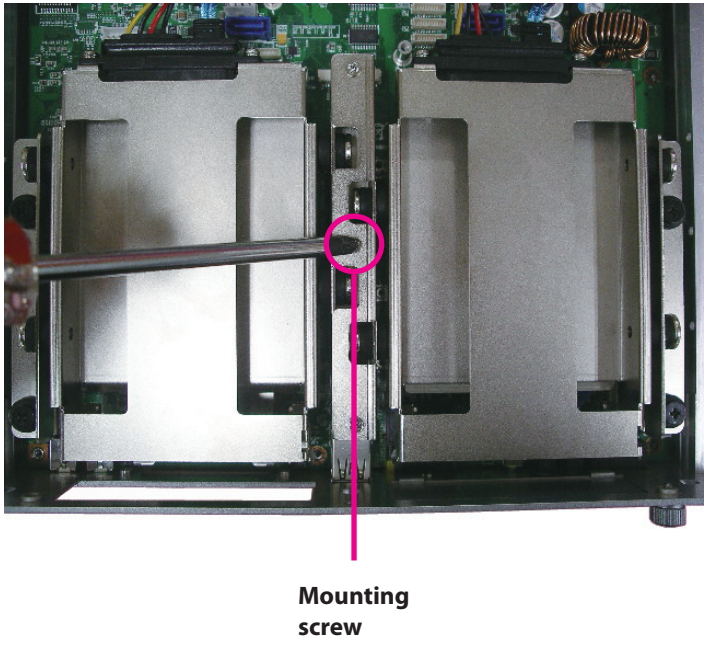
7. On the right side, similarly install the right hard drive bracket.



8. With both the hard drive bays installed, secure them together by tightening screws into the center where the two brackets meet.



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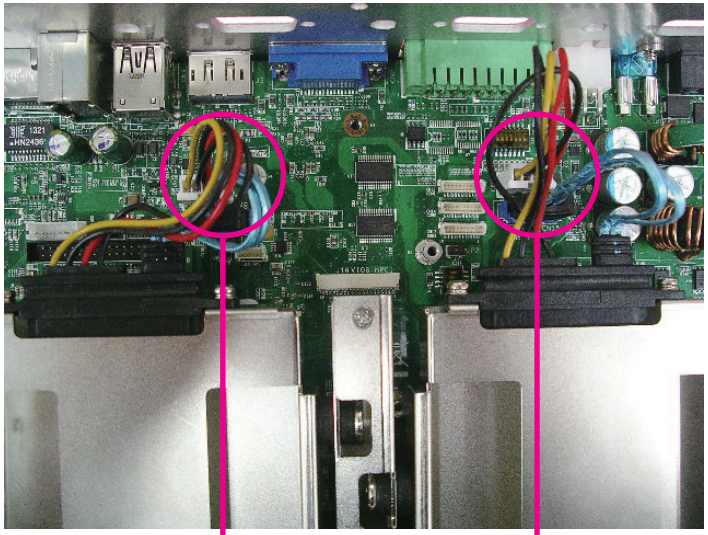
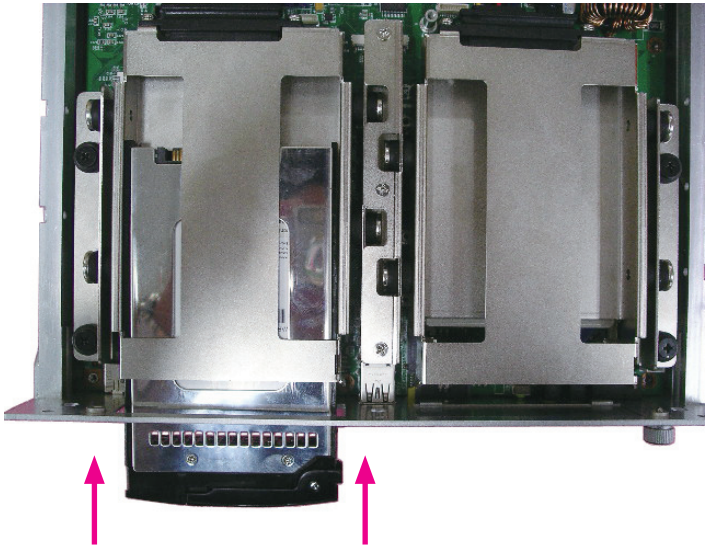
9. Connect the SATA data and power connectors to their respective connectors on the motherboard.



CN13 (SATA power)
CN16 (SATA data)

CN11 (SATA power)
CN15 (SATA data)

10. Insert the drive bay in the left SSD/HDD slot and tighten the thumb screws to secure it.



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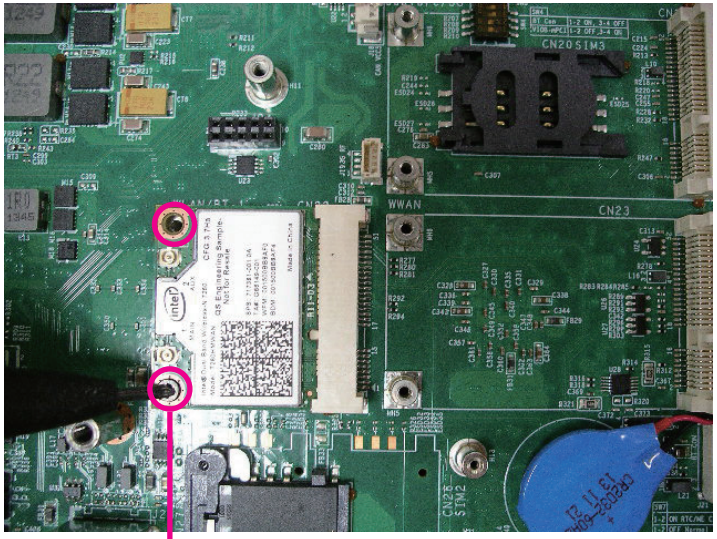
Installing a WLAN Module (Half Mini-PCIe)

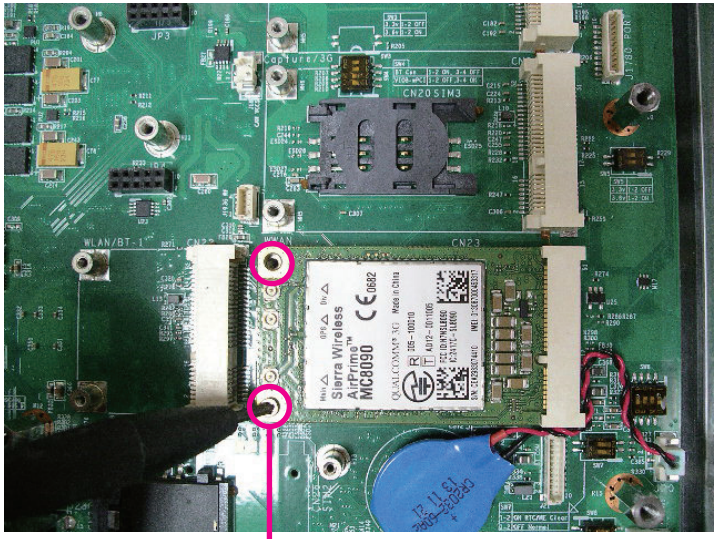
1. Locate the WLAN Mini PCI Express slot (CN22). Insert the module into the Mini PCI Express slot at a 45 degrees angle until the gold-plated connector on the edge of the module completely disappears inside the slot. Then fasten screws into the mounting holes to secure the module.



Mounting screws

Installing the First WWAN Module

1. Locate the WWAN Mini PCI Express slot (CN23). Insert the module into the Mini PCI Express slot at a 45 degrees angle until the gold-plated connector on the edge of the module completely disappears inside the slot. Then fasten screws into the mounting holes to secure the module.



Mounting screws

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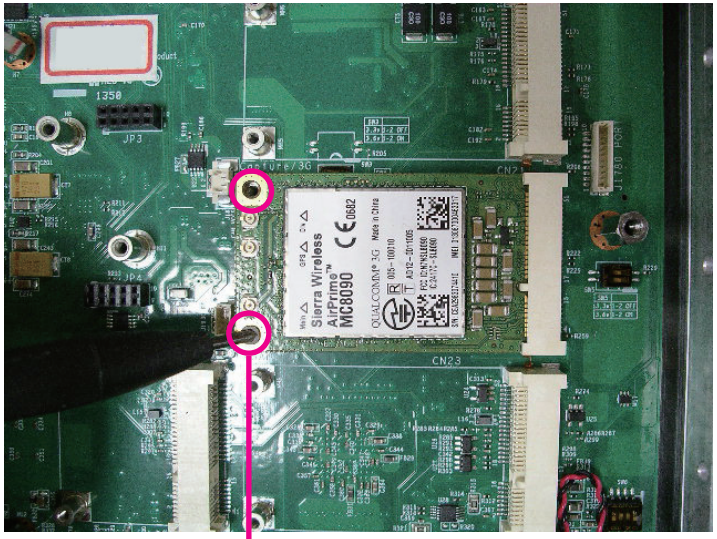
Installing the Second WWAN Module

1. Locate the WWAN Mini PCI Express slot (CN21). Insert the module into the Mini PCI Express slot at a 45 degrees angle until the gold-plated connector on the edge of the module completely disappears inside the slot. Then fasten screws into the mounting holes to secure the module.



Mounting screws

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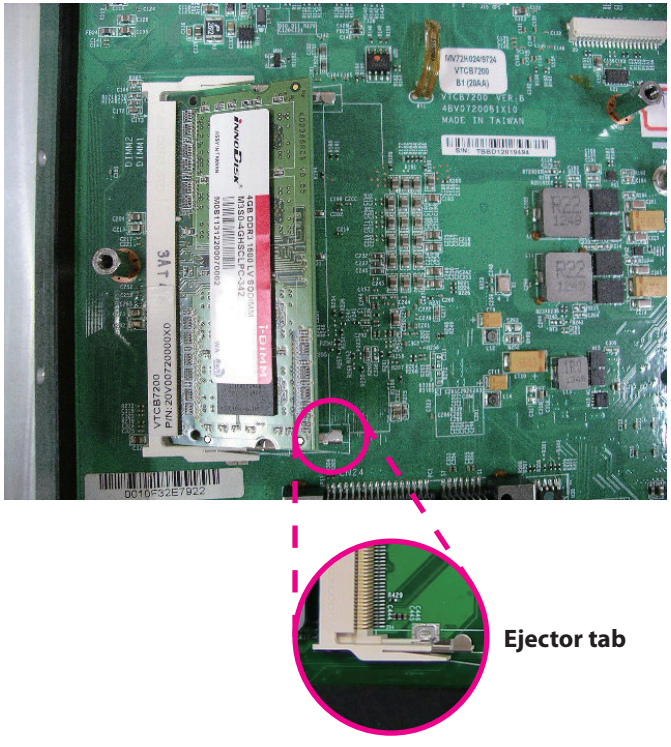
Installing a SO-DIMM

1. Push the ejector tabs which are at the ends of the socket outward. Then insert the module into the socket at an approximately 30 degrees angle. Apply firm even pressure to each end of the module until it slips down into the socket. The contact fingers on the edge of the module will almost completely disappear inside the socket.



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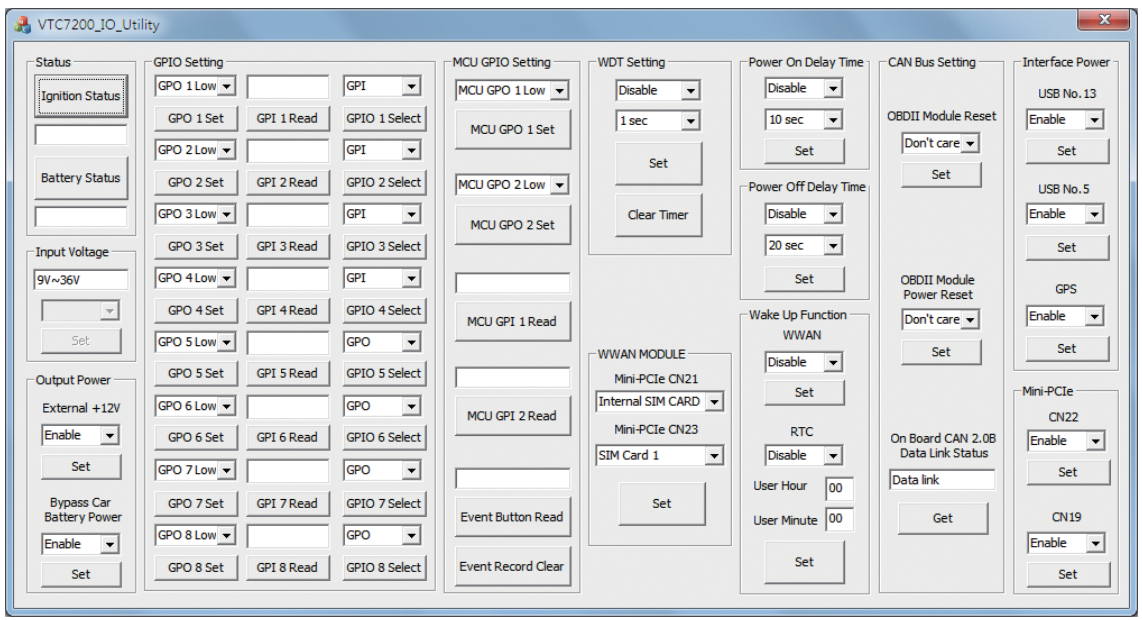
Appendix A:
Software Demo Utility for I/O Ports of Function Control

NEXCOM's software demo utility enables users to test and control different I/O port functions on the VTC 7220-R series. This document shows how to use the utility.

There are also source code files of the utility in the CD. Users can refer to the source codes to develop their applications.

Menu Screen



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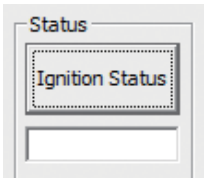
1.1 Status

1.1.1 Ignition Status

Press the button of Ignition Status, the signal of ignition will be shown.
ON …… Signal of ignition is high.
OFF ….. Signal of ignition is low.



1.2 GPIO Setting

1.2.1 GPIO Select

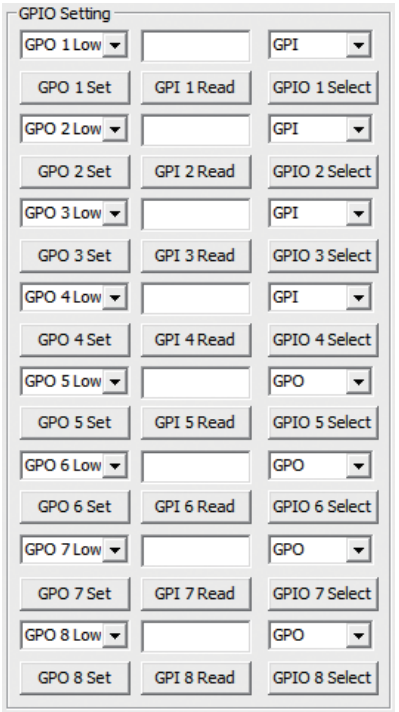
Defines GPIO port as GPO or GPI.

1.2.2 GPO Set

Selects the GPO ports and makes the output low or high.

1.2.3 GPI Read

Reads the status of GPI.



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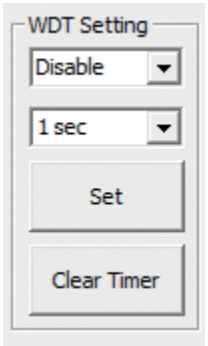
1.3 WDT Setting

Enables or disables the WDT function. There are 9 selections of time. The timer of WDT can also be cleared by Clear Timer button.



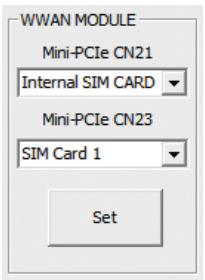
1.4 WWAN Module

1.4.1 Mini-PCIe CN21

Selects SIM2 or SIM3 card.

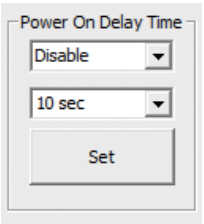
1.4.2 Mini-PCIe CN23

Selects SIM1 or SIM2 card.



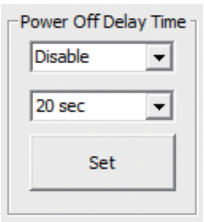
1.5 Power On Delay Time

Enables or disables the power on delay time function. There are 8 selections of delay time.



1.6 Power Off Delay Time

Enables or disables the power off delay time function. There are 8 selections of delay time.



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1.7 Wake Up Function

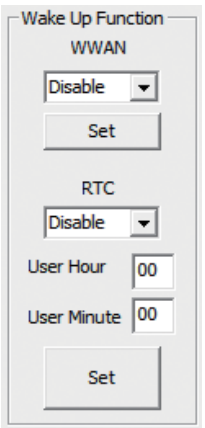
1.7.1 WWAN

Enables or disables the standby power to Mini-PCIe socket (CN23) for wake-up function.

** The wake-up function is triggered by external RING or SMS.

1.7.2 RTC

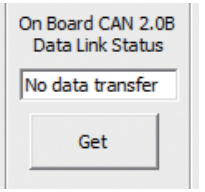
Enables or disables the RTC wake up function. The timer setting of RTC is located in BIOS setting.



1.8 CAN Bus Setting

1.8.1 On Board CAN2.0B Data Link Status

Reads the connection status of on board CAN2.0B



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1.9 Interface Power

1.9.1 USB No.13

Enables or disables the power to USB ports (No.13) on rear panel.

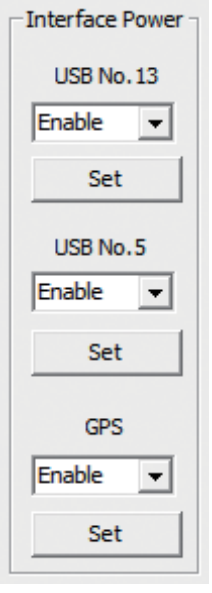
***In order to make all input devices (such as mouse and keyboard) work correctly, please do not disable USB No.13 and No.5 at the same time.**

1.9.2 USB No.5

Enables or disables the power to USB ports (No.5) on front panel.

1.9.3 GPS

Enables or disables the power to GPS module.



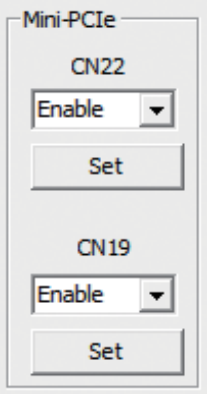
1.10 Mini-PCIe Power

1.10.1 CN22

Enables or disables the power to USB port on CN22.

1.10.2 CN19

Enables or disables the power to USB port on CN19.



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Appendix B: Using the GPS Feature

Module: uBlox-NEO M8L

Chip:

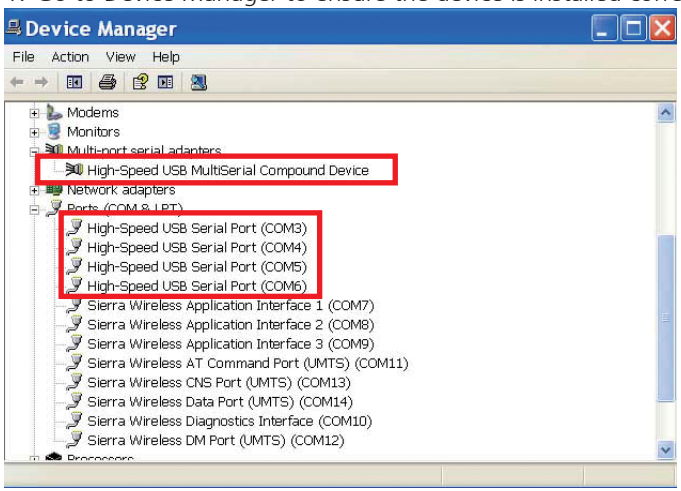
- **Receiver Type:**
  - 72-channel u-blox M8 engine
  - GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1
  - SBAS L1 C/A: WAAS, EGNOS, MSAS
  - Galileo-ready E1B/C (NEO-M8N)
- **Navigation Update Rate:**
  - Single GNSS: up to 18 Hz
  - Concurrent GNSS: up to 10 Hz
- **Accuracy Position:**
  - 2.0 m CEP
- **Acquisition:**
  - Cold starts: 26 s
  - Aided starts: 2 s
  - Reacquisition: 1 s
- **Sensitivity:**
  - Tracking & Nav: –167 dBm
  - Cold starts: –148 dBm
  - Hot starts: –156 dBm

Assistance
AssistNow GNSS Online
AssistNow GNSS Offline (up to 35 days)
AssistNow Autonomous (up to 6 days)
OMA SUPL & 3GPP compliant

Setup and Using GPS Information

Users can use the GPSinfo.exe program to verify that the GPS is correctly configured and working properly. Also, users can use the GPSinfo.exe program to enable WAAS/EGNOS and power saving mode.

1. Go to Device Manager to ensure the device is installed correctly.


Device Manager
File Action View Help
Modems
Monitors
Multi-port serial adapters
High-Speed USB MultiSerial Compound Device
Network adapters
Ports (COM & LPT)
High-Speed USB Serial Port (COM3)
High-Speed USB Serial Port (COM4)
High-Speed USB Serial Port (COM5)
High-Speed USB Serial Port (COM6)
Sierra Wireless Application Interface 1 (COM7)
Sierra Wireless Application Interface 2 (COM8)
Sierra Wireless Application Interface 3 (COM9)
Sierra Wireless AT Command Port (UMTS) (COM11)
Sierra Wireless CNS Port (UMTS) (COM13)
Sierra Wireless Data Port (UMTS) (COM14)
Sierra Wireless Diagnostics Interface (COM10)
Sierra Wireless DM Port (UMTS) (COM12)

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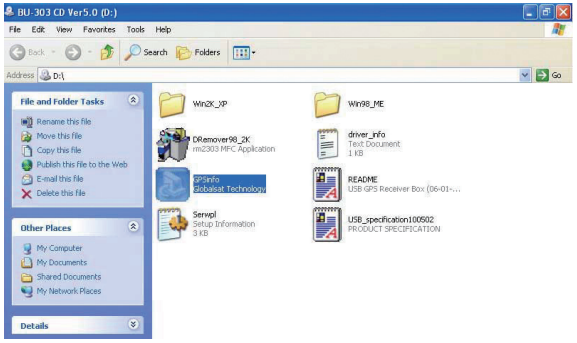
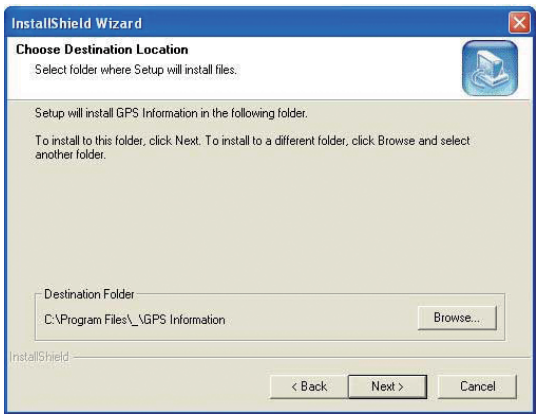
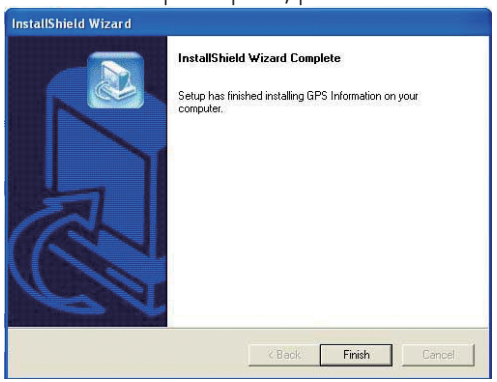
2. Insert the Installation Disc into CD-Rom drive and execute the "Gpsinfo. exe" file (the file also saved in C:\Utility\GPS_Utility).



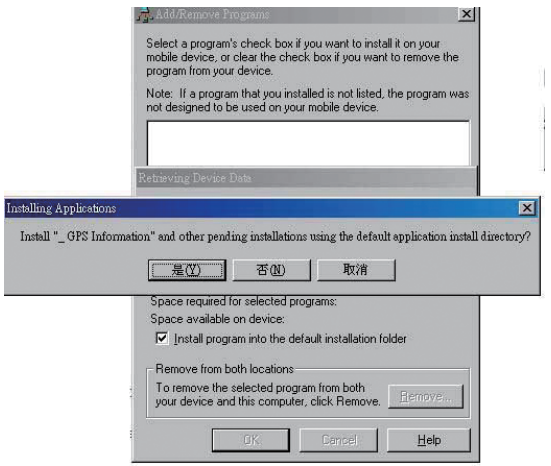
3. Follow the given instructions to complete the installation.


InstallShield Wizard
Choose Destination Location
Select folder where Setup will install files.
Setup will install GPS Information in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files_\GPS Information
Browse...
InstallShield
< Back
Next >
Cancel

4. When the setup complete, press <Finish>.



5. Once the installation is completed, installation of GPS Information onto PDA device will be launched automatically. Select <Yes> to continue.


Add/Remove Programs
Select a program's check box if you want to install it on your mobile device, or clear the check box if you want to remove the program from your device.
Note: If a program that you installed is not listed, the program was not designed to be used on your mobile device.
Retrieving Device Data
Installing Applications
Install "_ GPS Information" and other pending installations using the default application install directory?
是(Y)
否(N)
取消
Space required for selected programs:
Space available on device:
Install program into the default installation folder
Remove from both locations
To remove the selected program from both your device and this computer, click Remove.
Remove...
OK
Cancel
Help

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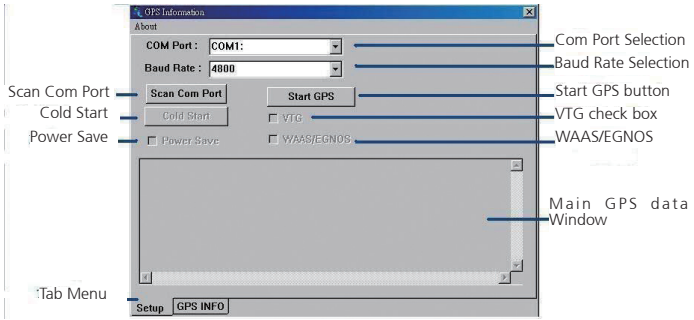
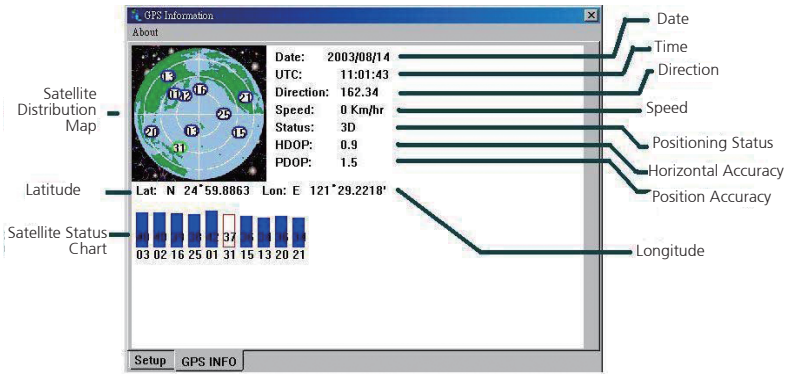
Setup Window Screenshot

Double click GpsInfo_Vista icon from Desktop to start GPS.



- Scan Com Port" - Scan all available communication port for GPS reception
- "Cold Start" - Cold start the GPS receiver
- "Power Save" - Check the box to enable/disable the Power Save Mode (the option is available only when a GPS device is found)
- "Tab Menu" - Switch between Setup and GPSINFO windows
- "Com Port Selection" - Select the appropriate communication port where GPS receiver is configured (it may be necessary to try several communication ports until the right one is found)
- "Baud Rate Selection" - Select the appropriate transferring rate **(Please set the baud rate at 9600)**
- "Start GPS button" - Turn on/off the GPS device
- "VTG check box" - Some navigation or map software requires to receive VTG data output for during operation. Check the box to activate the VTG data output.
- "WAAS/EGNOS" - Check the box to activate WAAS/EGNOS in order to increase the accuracy of positioning
- "Main GPS data Window" - Display data received by GPS device.

GPS Info Window Screenshot



- "Satellite Distribution Map" – Display the position of all connected Satellites
  - A unique number is assigned to each satellite.
  - Red circle indicates that the satellite location is known from almanac information; however, the satellite is not currently being tracked.
  - Green circle indicates that the satellite is being tracked; however, it is not being used in the current position solution.
  - Blue circle indicates that is being tracked and is being used in the current position.

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- "Latitude" – User's current latitude is displayed in N/S degree (North/ South Hemisphere) format
- "Satellite Status Chart" – display the status of each connected satellite
  - The number under each bar marks corresponding Satellite, and the height of each bar represents the strength of the satellite.
  - Red bar indicates that the satellite location is known from almanac information; however, the satellite is not currently being tracked.
  - Green solid bar indicates that the satellite is being tracked; however, it is not being used in the current position solution.
  - Blue bar indicates that the tracked and is being used in the current position.
- "Date" – display the current date in (dd/mm/yy) format.
- "Time" – display the current (UTC) time in (hh:mm:ss) format.
- "Direction" – display the current direction from 000.0° to 359.9°
- "Speed" – Display the current moving speed in km/hour
- "Positioning Status"- Three Modes
  1. No Fix
  2. 2D Positioning
  3. 3D Positioning
- "Horizontal Accuracy" - Range from 0.5 to 99.9, the smaller the better
- "Position Accuracy" - Range from 0.5 to 99.9, the smaller the better
- "Longitude" – Display current longitude in E/W (East/West Hemisphere) Time (hhmmss)

GPS Information Instructions

1. Make sure that the GPS device is properly inserted.
2. Start GPS Information Software.
3. Choose and select the proper communication port. (It might be necessary to try each available port to find the right one since the default communication port varies according to different hardware device.)
4. Click "Start GPS button" to activate the GPS receiver.
5. Upon successful connection, GPS output data should be displayed in "Main GPS data Window". If no data is observed, make sure the GPS receiver is working and properly inserted. Otherwise choose another communication port.
6. Satellite status can be observed in the "GPS Info Window". Use the "Tab Menu" to switch between Setup window and GPS info window.
7. Please make sure to de-activate the GPS device before exiting this program.

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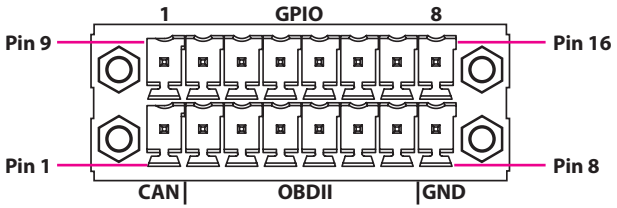
Appendix C: Signal Connection of DI/DO

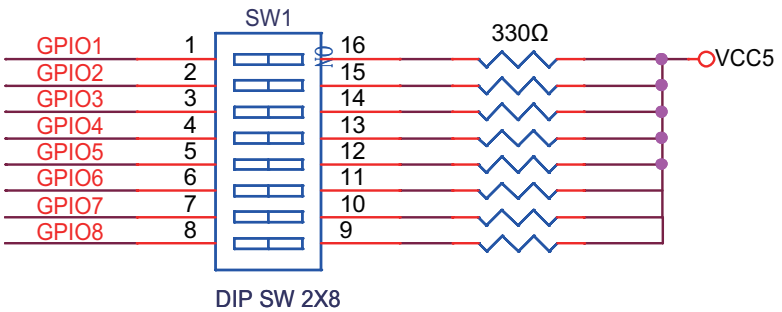
GPIO Pinout Description



Pin	Definition
9	GPIO1 (Default: GPI1)
10	GPIO2 (Default: GPI2)
11	GPIO3 (Default: GPI3)
12	GPIO4 (Default: GPI4)
13	GPIO5 (Default: GPO1)
14	GPIO6 (Default: GPO2)
15	GPIO7 (Default: GPO3)
16	GPIO8 (Default: GPO4)

GPIO can be programmed by S/W.
Please refer to the source code in utility.

SW1 Setting



GPIO (SW1)	
On	Pull up VCC5
Off	Don't Care

Default Settings:

GPIO (SW1)	
SW1.1~SW1.8	Pull up VCC5

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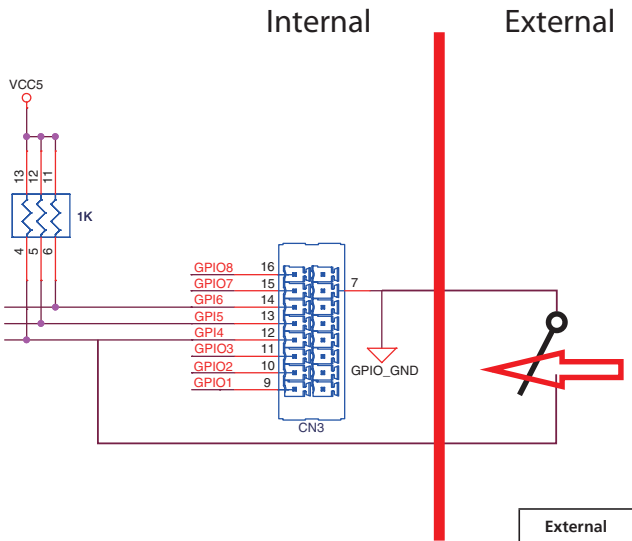
Digital Input

CN3 connector for GPI signal (digital signal input)
The CN3 has 4 digital input channels by default.

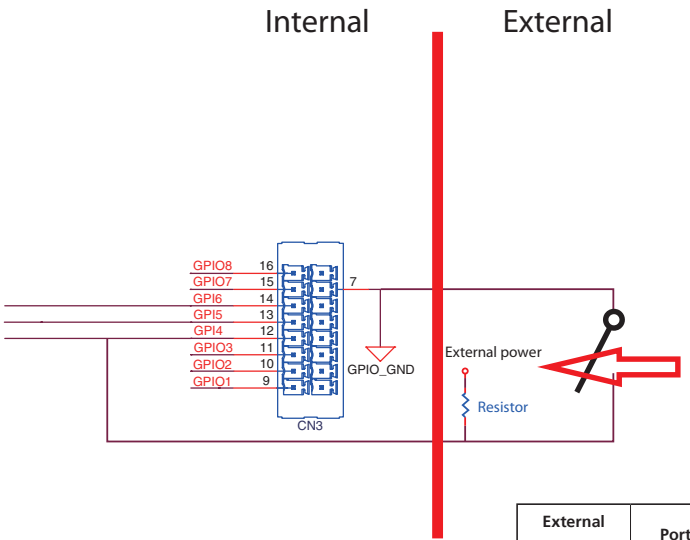
Wet Contact (default)
The GPI signals have a pull up resistor to 5V internally.

The figure below shows how to connect an external output source to one of the input channel.



External Switch	Port	GPI Register
ON (Short)	GND	0
OFF (Open)	OPEN	1

Dry Contact:



External Switch	Port	GPI Register
ON (Short)	GND	0
OFF (Open)	HIGH	1

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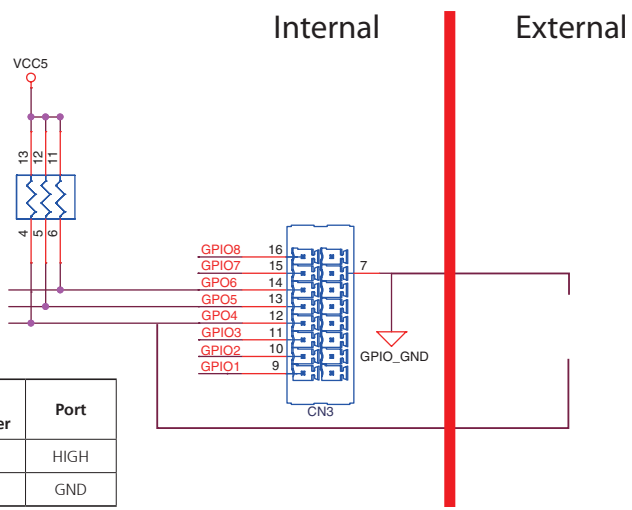
Digital Output

CN3 connector for GPO signal (digital signal output)
The CN3 connector has 4 digital output channels by default. The signal connection of CN3 support two connected methods for output signal type.

The output signal has two states, one is low level (driven to 0V from GPO signal) other is open (high voltage is provided from external device).

Wet Contact (default)
The SW1 needs to switch to "ON" state. The GPO signal will have a pull up resistor to 5V internally when you switch "SW1" to "ON" state. The output signal has two states, one is low level (driven to 0V from GPO signal) other is high level (driven to 5V from GPO signal).

The figure below shows how to connect an external input source to one of the output channel.

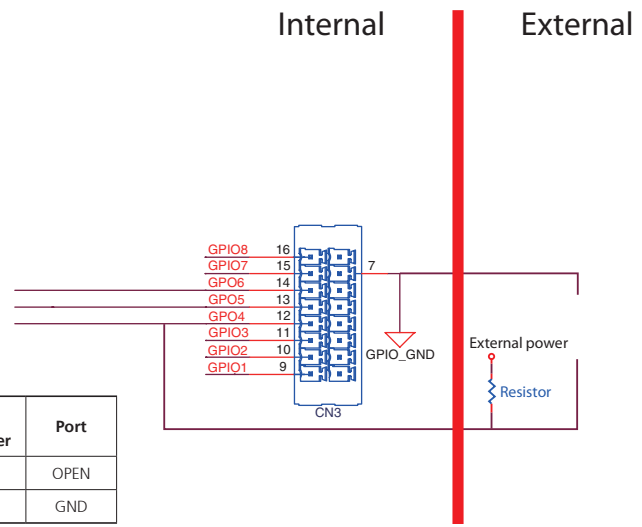


GPO Register	Port
1	HIGH
0	GND

Dry Contact
Each channel can accept 3~24Vdc voltage. And it is able to drive 150mA current for low level.

The SW1 needs to switch to "OFF" state. The GPO signal will no have a pull up resistor internally when you switch "SW1" to "OFF" state.

The figure below shows how to connect an external input source to one of the output channel.



GPO Register	Port
1	OPEN
0	GND

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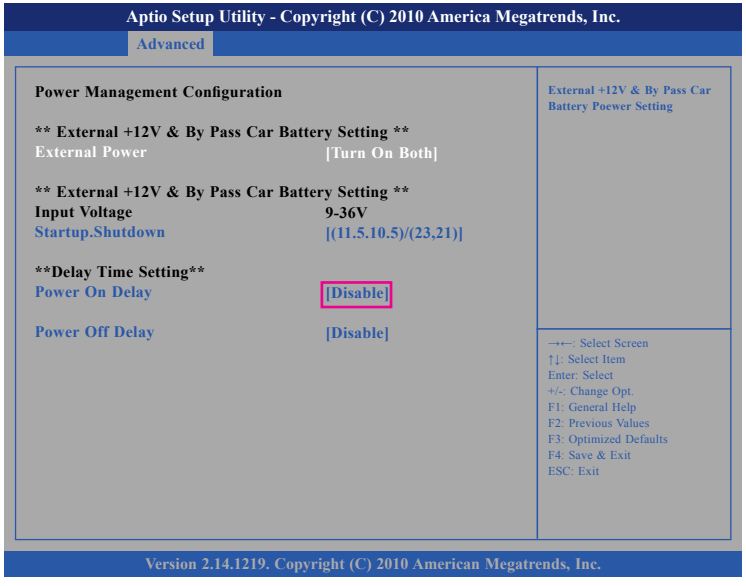
Appendix D: Power Management Setup

Power-on Delay Setting

Disable Power-on Delay


Aptio Setup Utility - Copyright (C) 2010 America Megatrends, Inc.
Advanced
Power Management Configuration
** External +12V & By Pass Car Battery Setting **
External Power [Turn On Both]
** External +12V & By Pass Car Battery Setting **
Input Voltage 9-36V
Startup.Shutdown [(11.5.10.5)/(23,21)]
Delay Time Setting
Power On Delay [Disable]
Power Off Delay [Disable]
External +12V & By Pass Car Battery Poewer Setting
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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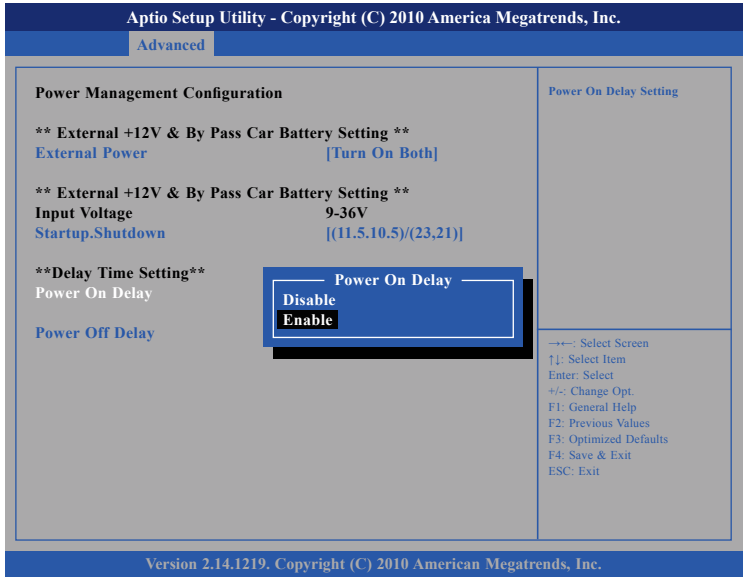
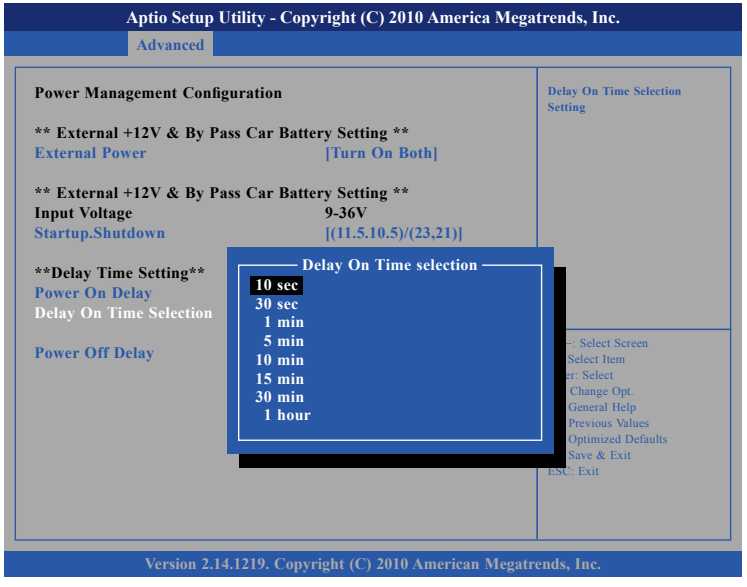
Enable Power-on Delay

Delay time can be set at 10sec/30sec/1min./5min./10min./15min./30min./1hour.


Aptio Setup Utility - Copyright (C) 2010 America Megatrends, Inc.
Advanced
Power Management Configuration
** External +12V & By Pass Car Battery Setting **
External Power [Turn On Both]
** External +12V & By Pass Car Battery Setting **
Input Voltage 9-36V
Startup.Shutdown [(11.5.10.5)/(23,21)]
Delay Time Setting
Power On Delay
Power Off Delay
Power On Delay
Disable
Enable
Power On Delay Setting
Version 2.14.1219. Copyright (C) 2010 American Megatrends, Inc.



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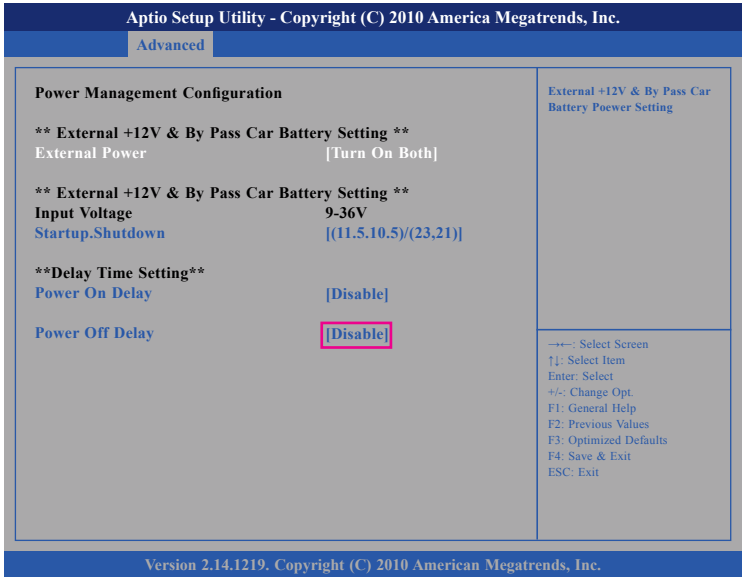
Power-off Delay Setting

Disable Power-off Delay


Aptio Setup Utility - Copyright (C) 2010 America Megatrends, Inc.
Advanced
Power Management Configuration
** External +12V & By Pass Car Battery Setting **
External Power [Turn On Both]
** External +12V & By Pass Car Battery Setting **
Input Voltage 9-36V
Startup.Shutdown [(11.5.10.5)/(23,21)]
Delay Time Setting
Power On Delay [Disable]
Power Off Delay [Disable]
External +12V & By Pass Car Battery Poewer Setting
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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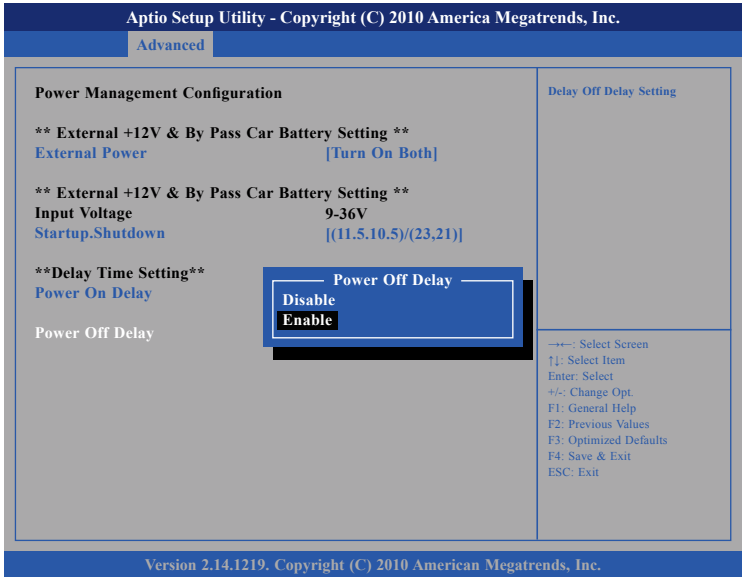
Enable Power-off Delay

Delay time can be set at 20sec/1min./5min./10min./30min./1hour/6hour/18hour.



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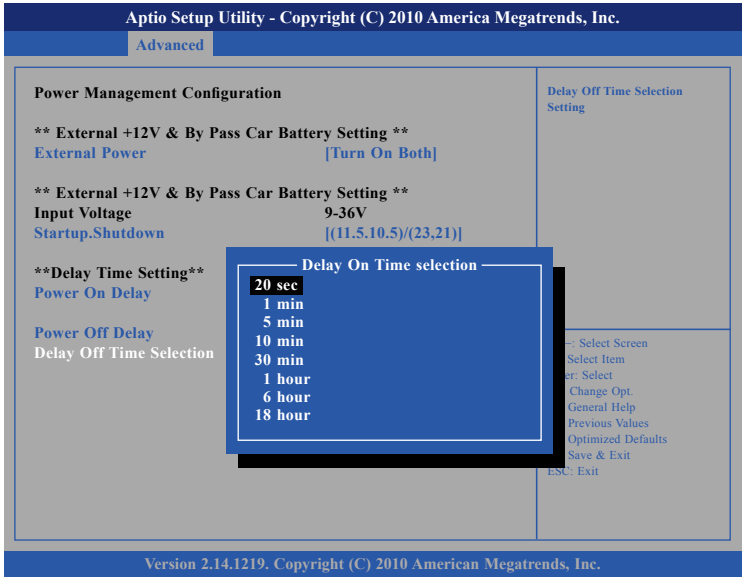

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Appendix E: GPS Dead Reckoning Module - VIOB-GPS-DR02

uBlox-NEO M8L Overview

The NEO-M8L standalone module combines the high performance u-blox M8 concurrent positioning engine with u-blox's 3D Automotive Dead Reckoning (ADR) technology, thus providing 100% coverage and continuous 3D positioning for road vehicle applications.

The NEO-M8L module provides high sensitivity, fast GNSS signal acquisition and tracking with low system integration effort. The module's on-board 3D accelerometer, 3D gyroscope sensors, and speed-pulse input (hardware or message-bus) deliver a complete solution for road vehicle ADR applications.

Technical Specifications

Features

Receiver type	72-channel u-blox M8 engine GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1 SBAS L1 C/A: WAAS, EGNOS, MSAS Galileo-ready E1B/C
Nav. update rate	Up to 20 Hz
Position accuracy	2.0 m CEP
ADR position error	(Estimated) 2% of distance travelled without GNSS
Acquisition	Cold starts: 27 s Aided starts: 4 s Reacquisition: 1 s
Sensitivity	Tracking & Nav: –160 dBm[1] Cold starts: –147 dBm Hot starts: –156 dBm
Assistance	AssistNow GNSS Online AssistNow GNSS Offline (up to 35 days) AssistNow Autonomous (up to 6 days) OMA SUPL & 3GPP compliant
Oscillator	Crystal
RTC	Built-in
Sensor	Onboard 3D accelerometer and 3D gyroscope
Supported antennas	Active or passive antenna
Odometer	Travelled distance
Data-logger	For position, velocity, and time

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Electrical data

Supply voltage	2.7 V to 3.6 V
Power consumption	31 mA @ 3.0 V (Continuous, default concurrent mode)
Backup Supply	1.4 to 3.6 V

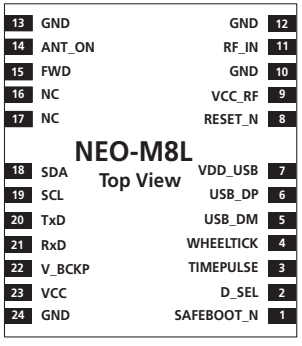
Interfaces

Serial interfaces	1 UART 1 USB V2.0 full speed 12 Mbit/s 1 SPI (optional) 1 DDC (I^2C compliant)
Digital I/O	Configurable timepulse
Timepulse	Configurable 0.25 Hz to 10 MHz
Protocols	NMEA, UBX binary, RTCM

Package

24 pin LCC (Leadless Chip Carrier): 12.2 x 16.0 x 2.4 mm

Pinout



Environmental data, quality & reliability

Operating temp.	–40° C to 85° C
Storage temp.	–40° C to 85° C

RoHS compliant (lead-free)

Qualification according to ISO 16750

Manufactured and fully tested in ISO/TS 16949 certified production sites

Uses u-blox M8 chips qualified according to AEC-Q100

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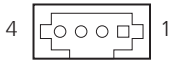
VIOB-GPS-DR02 consists of uBlox-NEO M8L and cables.
Here are the connector and cable pin definition for VIOB-GPS-DR02.

(1) Connect VIOB-GPS-DR02 and DB15 Cable
(On VIOB-GPS-DR02)

A. Connector type: 1x4 4-pin header
B. Connector location: J3



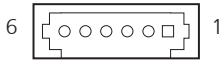
C. GPS module to DB15 Cable (4P TO D-SUB-15M)

Note: In order to fix the additional DB15 connector, replacing it with DB15 connector is necessary.

P2

(On VTC 7220-R Series)

A. Connector type: 1x6 6-pin header
B. Connector location: J15



Connector pin definition of P1

Pin	Definition	Pin	Definition
1	GND	3	Direction
2	NC	4	ODO Meter

Connector pin definition of P2

Pin	Definition	Pin	Definition
1	GND	3	Direction
2	NC	4	ODO Meter

Connector pin definition of J15

Pin	Definition	Pin	Definition
1	GPS_BAT	4	GPS_RX
2	GPS_LED#	5	GND
3	GPS_TX	6	VCC3_GPS

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Appendix F: Installing the System into a Rack Cabinet

Rack/Wall Mount Instructions

The following or similar rack-mount instructions are included with the installation instructions:

A) Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

B) Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

C) Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

D) Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern. Assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

E) Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips)."

Rack/Wall Mount Screw Type :
Round Head Screw,
P6#32Tx 1/4/SW7*0.8 w/spring + flat washer
SAE1080, NI-GP, Usage = 4

F) The system comes with rack brackets already installed at the bottom of left and right side. The rack brackets are used to support the system in rack/ wall mount. (See Figure1)

Warning:
Make sure you use the screws supplied with the mounting brackets. Using the wrong screws could damage the VTC 7220-R and would invalidate your warranty.

Caution:
Slide/rail mounted equipment is not to be used as a shelf or a work space.

Rack Mount **Wall Mount**

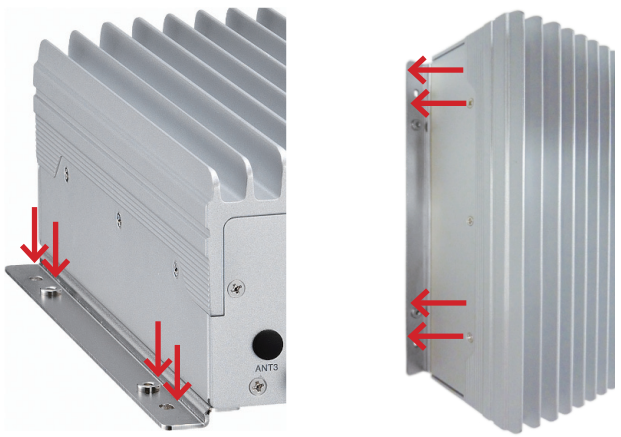

Figure 1. Fix rack brackets. Red arrows indicate the screw hole position.

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Appendix G: Connecting Earth Ground to VTC 7220-R

Warning:
The equipment is installed in a restricted-access location. It has a separate protective earthing terminal on the chassis that must be permanently connected to earth ground to adequately ground the chassis and protect the operator from electrical hazards.

Caution:
Before equipment installation begins, ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable that you supply. Power installation must be performed by a qualified electrician and comply with the National Electrical Code, ANSI/NFPA 70 and Canadian Electrical Code, Part I, CSA C22.1.

Connect VTC 7220-R to earth ground before you connect power to VTC 7220-R. You must use the protective earth terminal on the VTC 7220-R chassis to connect the VTC 7220-R to earth ground (see Figure 1 and Figure 2).

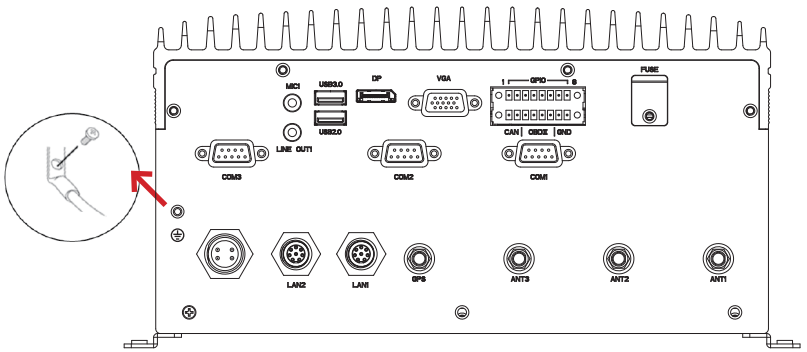

Figure 1. Connecting a Grounding Cable to VTC 7220-R.

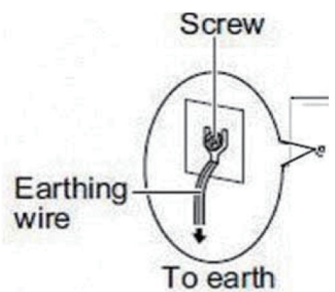

Figure 2. Connecting a Grounding Cable to Earth.

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Appendix H: Safety Icons

Safety Warning: This equipment is intended for installation in a Restricted Access Location only.

"CAUTION: Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

There must be a disconnect device in front of the "VTC 7220-R Series" to keep the worker or field site maintenance personnel be cautious and aware of closing the general power supply before they start maintenance. The disconnect device hereby means a 20A circuit-breaker.

Power installation must be performed by a qualified electrician and comply with the National Electrical Code, ANSI/NFPA 70 and Canadian Electrical Code, Part I, CSA C22.1."

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